



Ministry of Works and Human Settlements
Royal Government of Bhutan

Strategic Environmental Assessment for the Thimphu Structure Plan

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Acronyms and Abbreviations

ADB	Asian Development Bank
APIC	Agency for Promotion of Indigenous Craft
BBR	Bhutan Building Rules
BLSS	Bhutan Living Standard Survey
BoD	Bhutan Oil Distribution
BOC	Bhutan Olympic Committee
BRT	Bus Rapid Transit
CBS	City Bus Service
CCM	Council of Cabinet Ministers
Chhu	River or Stream
CoP	Conference of Parties
CPLC	Cash Payment in Lieu of Land Compensation
CSO	Civil Society Organisations
DCR	Development Control Regulation
DDM	Department of Disaster Management
DITT	Department of Information Technology and Telecom
DNP	Department of National Properties
EA	Environment Assessment Act 2000
E.coli	Escherichia coli
EV	Electric Vehicle
FYP	Five-Year Plan
GCF	Global Climate Fund
GEF	Global Environment Facility
GNHC	Gross National Happiness Commission
GHG	Green House Gas
IFC	International Finance Corporation
IT Park	Information Technology Park
PEI	Poverty Environment Initiative
PPP	Policy, Plans and Programmes
Kgpcd	Kilogram Per Capita Per Day
LAP	Local Area Plan
LGA	Local Government Act
Lpcd	Litre Per Capita Per Day
MoF	Ministry of Finance
MoHCA	Ministry of Works and Human Settlement
MoWHS	Ministry of Works and Human Settlement

MoEA	Ministry of Economic Affairs
MLCP	Multi-Level Car Park
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
MLD	Million-Litre Per Day
MRG	Mainstreaming Reference Group
MT	Metric Tonnes
NECS	National Environment Commission Secretariat
NES	National Environment Strategy
NKRA	National Key Result Areas
NLCS	National Land Commission Secretariat
NN	Neighbourhood Node
NRW	Non-Revenue Water
PES	Payment for Ecosystem Services
RGoB	Royal Government of Bhutan
RBG	Royal Body Guard
RSTA	Road Safety and transport Authority
PAVA	Property Assessment and Valuation Agency
RBA	Royal Bhutan Army
RBP	Royal Bhutan Police
SAR	Search and Rescue
SEA	Strategic Environmental Assessment
SDGs	Sustainable Development Goals
SoP	Standard Operating Procedures
STP	Sewerage Treatment Plant
Sq.m	Square Meter
TSP	Thimphu Structure Plan
Thromde Tshogde	City Council
Thimphu Thromde	Referred to as Thimphu Municipal
Thromde Thuemis	City Councillors
Thim Throm	Thimphu Throm also referred to as Thimphu City
UNEP	United Nations Environment Programme
UNDP	United Nations Development Programme
UNFCC	United Nations Framework on Climate Change
UV	Urban Village
WB	World Bank
WTP	Water Treatment Plant

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A wide range of stakeholders representing central and local government agencies, private sector, media, civil society, and local communities provided input into this assessment. Their active engagement in the stakeholder consultations and other communication activities ensured a highly participatory SEA process.

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EXECUTIVE SUMMARY

Context: As the economic and governance hub of Bhutan, Thimphu Throm has grown rapidly and is host to about a fifth of the country's total population. With limited room for expansion, numerous social and environmental issues are already evident. The implementation of the *Thimphu Structure Plan (TSP) 2002-2027* amidst competing policies, plans and programmes (PPPs) has presented challenges including some deviations from its original intent. A Strategic Environmental Assessment (SEA) for the TSP is therefore timely, as it will support the possible review, update or revision of the structure plan to make it more relevant to the changing context. The building of local capacities and experiences through this process is further expected to support integration of SEAs into a wider array of PPPs in the country.

Approach: The SEA was conducted by a multi-sectoral Core Team led by the Ministry of Works and Human Settlement (MoWHS), following internationally established principles and requirements adapted to suit the Bhutanese context. It focuses on the 26 km² area under the jurisdiction of Thimphu Thromde and covered by the TSP, while also considering the "influence areas" or the large hinterland with which it interacts in various ways. Based on a scoping exercise initiated in 2016, it takes into account recent developments, trends and future challenges pertaining to Thimphu Thromde, as well as the TSPs alignment with relevant international agreements and national PPPs. It utilises data available with the relevant agencies as well as past studies and documents.

The prioritisation of issues considered for the assessment was based on the sustainability perspective and validated during public consultation meetings. Analysis and recommendations are based on two population scenarios with a time horizon of 2027: a population of 160,000 as per the TSP projections, and a population of 200,000 as per the 2005 Population and Housing Census of Bhutan (PHCB) projections.

Findings and recommendations: Substantial changes have occurred to **land-use** identified in the TSP, given increasing pressure from developmental activities as well as non-compliance and weak implementation of rules and regulations. **Neighbourhood nodes** (NN) intended to serve as the service and commercial centre for urban villages—to help decongest the urban core while benefitting local residents—have largely not materialised. Development of inappropriate infrastructures along steep **slopes** have resulted in slope failure and landslides, further leading to disruption of water supply, road blockages, and power disruption. It will therefore be necessary to review and reassign the land-use or precinct classification as appropriate; implement the NNs as intended; physically inspect the ground realities and disallow deviations from intended use; among other measures.

Meanwhile key issues related to **water** include irregular supply; inadequate and unequal distribution; illegal tapping and diversion; high presence of *Escherichia coli* (*E. coli*) at certain sections of the Wang Chhu; and loss of huge volumes of water due to wastage, unsustainable consumption, and an old distribution network system. While some deficits in water supply is expected along the way, the ongoing construction of Water Treatment Plants (WTP) and expected commissioning of Thimphu Thromde's central water supply scheme in several phases is expected meet total water demand in Scenario 1, as well as in

Scenario 2. Nevertheless, a need exists for proper management, including sustainable water consumption and conservation practices at all levels, to avoid depletion of natural water resources.

The completion of additional **sewerage** network constructions in the *Thromde* is expected to increase the proportion of households connected to the Sewage Treatment Plant (STP). Projections indicate, however, that the STPs will not be adequate to cater to the increased population in Scenario 1, requiring the augmentation of existing capacities. A long-term sewerage master plan, advocacy and awareness-raising on the proper utilisation of sewerage infrastructure, and exploration/promotion of innovative sewerage treatment technology are additional requirements. The projection of a much larger deficit in STP capacity in Scenario 2 calls for the construction of additional treatment plants.

The increasing concretisation of Thimphu Throm has caused diversions to its natural watercourse, and the **storm water drainage** infrastructure today remains inadequate in terms of planning, quality and functionality. Guidelines are needed to guide and monitor the quality of constructions, and natural watercourses should not be disturbed but instead be protected and restored. Advocacy for behavioural change is required to address poor civic sense and to increase awareness of the consequences of dumping wastes, while innovative forms of treatment technology need to be utilised to treat the storm water at the end of the drainage system prior to being drained into the Wang Chhu.

Poor management of **solid waste** is mostly attributed to insufficient infrastructure, facilities and services. Current efforts to extend existing capacity will not be adequate to cater to increased waste generation projected in Scenario 1. It will be necessary to implement the fundamentals of sustainable waste management such as the 3-Rs (Reduce, Reuse and Recycle), segregation at source, composting, among others. Raising awareness on civic responsibility and the promotion of sustainable consumption habits will need to accompany the development of an adequate SWM system. Moreover, the increased waste generation projected in Scenario 2 will require additional infrastructure and services including a new sanitary landfill and transfer stations.

The disproportionate growth in private car ownership to public transport services has already led to traffic congestion and excessive amount of on-street parking, while also worsening air quality. Bus services in Thimphu are still largely inadequate. Extreme congestion on the main streets of Thimphu during peak hours is foreseen in Scenario 1, possibly causing sections of the network to become more overloaded and congested. It will be critical to improve the existing bus services, promote non-motorised transport such as pedestrianisation and cycling, and streamline some institutional arrangements. The severity of congestion and traffic issues is projected to be worse in Scenario 2, warranting policy interventions and major investments to promote eco-friendly and efficient public **transport and mobility** system.

While deviation from the TSP in terms of increasing population density in the urban villages has meant that the city now accommodates more than what was initially proposed, the area identified for housing in the TSP is enough to accommodate increased population in both Scenario 1 and Scenario 2. However, more attention needs to be given to addressing the

issues of **housing** affordability and accessibility, home ownership, earthquake and fire resilience, and integration of social spaces within housing provisions in accordance with the TSP's principle of community conviviality.

As Thimphu Throm is vulnerable to earthquakes, flash floods and fires, it is critical that each area be prepared for potential **disaster** by ensuring the functionality of key lifeline services. The clear identification of appropriate evacuation centres, and rescue and operational resources, as proposed by the Thromde's various contingency plans must also be carried through. A need also exists to study and maintain buffers along streams and rivers to reduce vulnerability during flash floods, as well as to ensure proper land-use to reduce vulnerabilities to other hazards.

In all, the effective implementation of the TSP is constrained by a lack of clear **governance** guidelines, weak human resource capacities, as well as weak ownership of the TSP among stakeholders. Pressures from sections of the population to revise the TSP present additional challenges especially for Thimphu Thromde as the largest and most visible urban governance actor. Therefore, an overarching legislation and policy for urban governance is required, and all stakeholders need to assume greater ownership of the TSP to strengthen collaboration and expand partnerships for development while also mainstreaming inclusiveness. The Thromde's human resources capacities also need to be strengthened, in addition to instituting measures to facilitate revenue generation and attain fiscal sustainability.

Alternatives and way forward: Alternatives relating to land-use, housing, water, sewerage, municipal solid waste, disaster, transport and mobility, and governance are provided, with Alternative 1 based on a projected population of 160,000, and Alternative 2 based on a projected population of 200,000 by the year 2027. The approaches and capacities required to meet the needs of a growing population are similar for both scenarios, though Alternative 2 requires a greater degree of action. The SWOT analysis (Strength, Weakness, Opportunities and Threat) and TOWs tool (Threat, Opportunities, Weakness and Strength) that were utilised in this study provide additional references to facilitate decision-makers in their selection of the alternatives.

Moving forward, the participatory process that has been central to the SEA process will continue, so as to ensure wide dissemination of outcomes as well as support for the ensuing recommendations. An implementation plan to take the outcomes forward will also be deliberated and finalised.

1 INTRODUCTION AND CONTEXT

The conduct of this Strategic Environmental Assessment (SEA) for a Structure Plan is the first of its kind in Bhutan. Based on the guidelines prepared by the National Environment Commission Secretariat (NECS) to support the uptake of SEAs in Bhutan and to demonstrate their benefits, the Thimphu Structure Plan was identified for the assessment.

Despite the limited room for expansion, Thimphu, as the capital city, has been facing rapid population growth, and numerous social and environmental issues are already evident. Meanwhile, implementation of the Thimphu Structure Plan over the last 13 to 14 years has been a challenging experience given the rapid pace of development and some deviations from its intent amidst competing policies, plans and programmes. Undertaking this strategic assessment is therefore timely, as such trends, though inevitable, must be mitigated with alternative options that are environmentally and socially sustainable, and decision-makers must be accordingly appraised.

The analysis and recommendations presented in this SEA, are based on two population scenarios with a time horizon of 2027: a population of 160,000 as per the TSP projections, and a population of 200,000 as per the 2005 Population and Housing Census of Bhutan (PHCB) projections. Based on the issues identified, and an assessment of the existing infrastructure, services and facilities against the projected population scenarios, alternatives are provided relating to land-use, housing, water, sewerage, municipal solid waste, disaster, transport and mobility, and governance. As such, this SEA is intended to critically inform and facilitate proper implementation of the TSP, including its possible review and revision in the future to make it more relevant to the unfolding scenario.

1.1 Background

In accordance with the principles of Gross National Happiness (GNH),¹ the conservation of the natural environment and the concept of balanced and sustainable development have been central themes in Bhutan's approach to development. Such an orientation is advocated by key policy documents such as *Bhutan 2020: A Vision for Peace, Prosperity and Happiness*, and *the National Environment Strategy* (NES) of 1998. The Constitution of the Kingdom of Bhutan, no less, requires that a minimum of 60 percent of Bhutan's total area remain under forest cover for all time.² It states that it is:

...a fundamental duty of every citizen to contribute to protection of the natural environment, conservation of the rich biodiversity of Bhutan and prevention of all forms of economic degradation.

¹ GNH is Bhutan's guiding development philosophy, enunciated by His Majesty the Fourth Druk Gyalpo and enshrined in the Constitution of the Kingdom of Bhutan. It advocates for development that is holistic, sustainable and inclusive to enable the pursuit of happiness.

² About 70 percent of its land area is covered by natural forests with close to 50 percent of the country designated as national parks, nature reserves and biological corridors. The country sequesters more than twice the amount of carbon it emits.

Bhutan also committed to remaining a net carbon sink in perpetuity during the 15th Conference of Parties (CoP) to the United Nations Framework on Climate Change in 2009 and has since reiterated its commitment in its Nationally Determined Contribution (NDC) to tackling climate change. Well recognised for its leadership in sustainable development and environmental stewardship, its progress on *Goal 13: Climate Action* of the Sustainable Development Goals (SDGs) is particularly noteworthy.

However, Bhutan's fragile mountain ecosystem is vulnerable to the risks of global warming. Climate change has manifested in the form of rising temperatures and erratic rainfalls, increasing the risk of a host of natural calamities such as glacial lake outburst floods (GLOF), flash floods, pest and disease outbreaks, landslides, among others. Development in Bhutan is therefore challenged by harsh geophysical conditions and weather-induced calamities. At the same time there is increasing pressure on the natural environment and resources, making it difficult to balance conservation and economic development. The loss of prime agricultural land to urbanisation, increased health problems, water scarcity, waste management, and climate change are some of the major environmental and social issues gaining intensity.

Urbanisation in Bhutan has been occurring rapidly, from five percent as recently as 1995 to 31 percent a decade later. The urbanisation pattern has been highly skewed towards the Western region, and Thimphu as the economic and governance hub hosts almost a fifth of the total population of the country today.³ While its population is expected to double by 2030, the room for expansion in the city is limited. Already numerous issues related to urban poverty, inadequate public infrastructure and services, housing provisions, environmental deterioration, congestion, pollution, waste, crime, unemployment, among others, have arisen and pose a growing challenge.

The *Thimphu Structure Plan (TSP) 2002–2027* was prepared in 2001-2002 and approved by the Royal Government of Bhutan (RGoB) in 2004, during which time the City's population stood at 43,479. As a 25-year plan to be implemented by Thimphu Thromde, the structure plan document was accepted as an official plan in 2003. Based on a population projection of 162,327 by the year 2027, the TSP's main thrust is on formulating area development strategies with land use planning that stresses integration of the natural environment and rich cultural heritage. It identifies key issues and provides long-term implementation plans with funding needs, as well as detailed proposals for action pertaining to infrastructures and services.

During 2002–2006, as the first stage of implementing the TSP, ten detailed Local Area Plans (LAPs) for the extended areas of Thimphu Throm were prepared using the land pooling method. The LAPs were intended to detail out the steps to be taken at the local level for implementation, under the guidance of the Development Control Regulations (DCR) of Thimphu Thromde. While its implementation is a continuous process, there are other policies and programmes that are also being implemented and/or being proposed that do not conform with the TSP.

³ Ministry of Works and Human Settlement. *Bhutan National Urbanization Strategy*. RGOB, 2008.

Against this backdrop, the Mainstreaming Reference Group (MRG) recommended that a Strategic Environmental Assessment (SEA) be conducted for the TSP.

1.2 Rationale and purpose of the SEA for the TSP

In accordance with the Environmental Assessment Act of 2000⁴, the Regulations for Strategic Environmental Assessment was introduced in 2002. Article 5 of the SEA Regulations state:

Any agency that formulates, renews, modifies or implements any policy, plan or programme including Five-Year developmental plans which may have a significant effect on the environment, shall perform a Strategic Environmental Assessment in accordance with this regulation, before the proposal is adopted or submitted to the Royal Government of Bhutan.

SEAs are vital to guide and support the development of, and decision-making related to, policies, plans, programmes (PPPs) and similar strategic instruments, by identifying and assessing critical environmental and social issues associated with such PPPs. Undertaken at decision-making levels, above the project level, it has been defined by the OECD DAC (2006) as:

...analytical and participatory approaches to strategic decision-making that aim to integrate environmental considerations into policies, plans and programmes and evaluate the inter linkages with economic and social considerations.

As an agent of change and a development catalyst, the Thimphu Structure Plan has the potential to create significant positive, negative and cumulative impacts. With its implementation already underway, it is therefore crucial to review the overarching PPPs that have a bearing on development in the TSP, and to assess their impacts on the environment and social fabric and conditions, so that they can be mitigated and/or optimised with the effective implementation of identified actions.

The SEA would therefore support the TSP's possible review, update, or revision in order to make it more relevant to the current scenario. An additional benefit of undertaking this SEA is the building of local capacities and experience, which is expected to lead to and facilitate the integration of SEAs into a wider array of PPPs in the country.

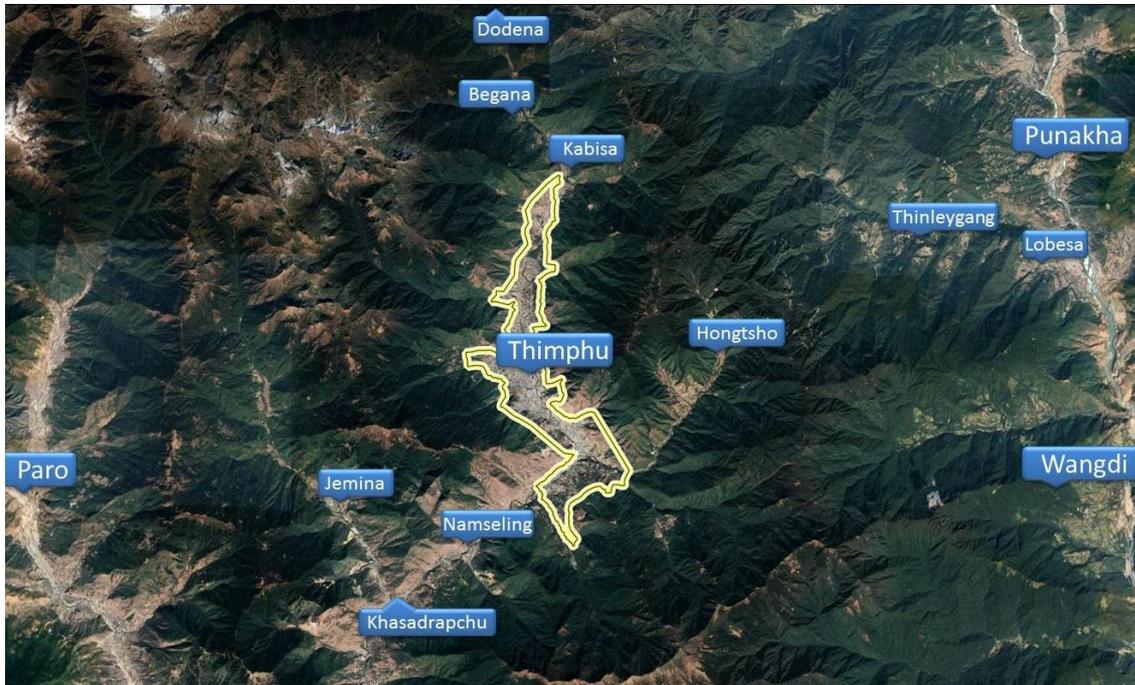
As such, the SEA for the TSP has the following objectives:

- To assess PPPs relevant to the Thimphu Structure Plan, and to identify critical environmental and social issues so as to provide appropriate recommendations and mitigation action plans relating to Thimphu; and

⁴ This Act establishes procedures for the assessment of the potential effects of strategic plans, policies, programmes and projects on the environment, and for the determination of policies and measures to reduce potential adverse effects and promote environmental benefits.

- To guide and support the development of and decision-making related to PPPs, which will enable sustainable development in keeping with the principles of GNH.

1.3 Geographic focus



Map 1: Thimphu Thromde and influence areas

The SEA focuses on an area of 26 km² falling within the Thimphu Thromde boundary under the TSP. Dechenchholing in the north and Serbithang in the south mark the administrative extremities of the Thromde. However, Thimphu Throm is not isolated but interacts with a large hinterland within which strategic issues arise that affect the Throm, and vice versa. This hinterland includes the areas of Kabisa, Begana, Dodena, Namseling, Khasadrapchu, Jemina, Hongtsho and Lobesa under Thimphu Dzongkhag, as well as other influence areas in the neighbouring *dzongkhags* of Paro, Punakha and Wangduephodrang.

Thus, while this SEA focuses on the TSP and Thimphu Throm, the wider network of influence areas within which it is situated is also important to consider in the larger context of development trends. In this respect, brief overviews of the three *dzongkhags* are provided in [Annex 1](#).

1.4 Social, economic and environmental outlook of Thimphu Throm

Thimphu became a town in 1961 and grew as the capital of Bhutan. The central government administration as well as a number of corporate bodies are headquartered here, and it is the largest urban center in the country. Bhutanese culture is well reflected within the Throm with vibrancy of local customs and traditions; religion and monastic practices; traditional and modern music, dance, arts, literature; languages and dialects; cuisine; etc. It also hosts the Jigme Dorji Wangchuck National Referral Hospital and a number of educational institutions, including a private college.

As such, Thimphu Throm attracts many people from other *dzongkhags* who wish to avail of the various business, health, education and entertainment services, as well as for employment opportunities and to accompany family members. As the capital city, it is also one of the highest tourist density spots with dynamic commercial activities. Tourist groups flying into nearby Paro International Airport visit Thimphu as a key destination before transiting to other parts of the country. The existence of a good network of roads also provides the city with good market access for agricultural products from other dzongkhags; and construction materials such as timber is drawn from Paro and Haa, while sand and stone are supplied from the Wangduephodrang valley.

However, even as Thimphu Throm has better urban infrastructure facilities and services compared to other towns and cities in the country, it has not been able to adequately upgrade the existing capacities at par with its rapid growth. This has resulted in unplanned development in peripheral areas, chronic shortage of affordable housing, lack of clean and reliable drinking water, issues of solid waste management, traffic congestion and pollution, and increasing issues of crime and safety.

In keeping with the 11th Five Year Plan (FYP) objective of *'Self-reliance and Inclusive Green Socio-Economic Development'*, Thimphu Thromde has aimed at developing an economically vibrant, ecologically sustainable and energy efficient city, with the objective of making Thimphu Throm a *'Clean, Green and Liveable City'*. Towards this end, the Thromde was allocated capital grants of Nu. 2.27 billion in the 11th FYP.

Further, the upcoming 12th FYP focuses on inclusive development by giving priority to "Liveability, safety and sustainability of human settlements improved" and "Healthy and caring society enhanced" as two of the 16 national key result areas (NKRAs) of the 12th FYP. It also includes "vulnerable groups" among other crosscutting themes to be addressed by all agencies and local governments, ensuring that new infrastructure, including area plans, incorporates these concerns.⁵

1.5 Summary of Thimphu Structure Plan 2002-2027

As mentioned, Thimphu Thromde is also guided by its existing structural plan⁶ with its emphasis on sociocultural vibrancy and environmental protection. Key features of the TSP are presented in the box below, followed by the status of implementation of local area plans in Table 1 and a stocktaking of TSP activities between 2002 to 2017 in Table 2.

⁵ Gross National Happiness Commission. *Guidelines for Preparation of the 12th Five Year Plan*. RGOB. 2017.

⁶ A Structure Plan is a local level spatial plan with regulatory effect covering a Throm, village, commercial service centre or other settlement area. It states the specific objective to be pursued in the use of land by establishing zones and precincts and, within these, permitted and prohibited activities including the intensity of development is defined.

Thimphu Thromde has grown very rapidly since its establishment as the capital of the nation in 1955. The first urban plan was prepared in 1964 but remained unimplemented. Another urban development plan was prepared in 1986, which guided the development of Thimphu through the 1990s. A strategic plan prepared in 1998 influenced the expansion of the then 8 sq. km. of municipal boundary for wider coverage. In the same year the Council of Ministers issued directives to further guide urban development with the objective to make Thimphu a 'dream city' of all Bhutanese that is culturally vibrant, environmentally sustainable and above all people friendly.

The preparation of the new development plan for Thimphu, covering an area of 26 sq. km. began in 2001. The 25-year plan was given the highest priority and involved consultation with all stakeholders. Formal approval of the Structure Plan (TSP) (2002-2027) was received from the Council of Ministers in 2003. It comprises 22 'Themes', nine 'principles' of Intelligent Urbanism, and 10 fundamental 'strategies'.

Main themes: Nation building and civil society; City of our dreams; Tashichho Dzong; Conviviality and human Scale; Public policy and urban form; Bhutanese dream; Parable of archery; Urban growth; Domain of automobiles; Reclaiming the public domain; City core; Gateway to the Capital; Urban corridor; Urban villages; Open space system and the Wang Chhu; Footpath system; Forest boundary and city landscape; Peripheral zone control; Knowledge city; Social services; Utilities network; Shelter systems; and the National Capital Region.

Nine principles of Intelligent Urbanism: Balance with nature; Balance with tradition, Conviviality; Efficiency; Human scale; Opportunity matrix; Regional integration; Balanced movement; and Institutional integrity.

Ten strategies: Decentralisation of growth; Regionalisation of growth; Densification; Transport oriented growth; Resource utilization; Urban precincts; Public assets; Defining the urban core; Facilitating access to shelter; and 'Let it be!'.

The TSP addresses critical issues requiring action; spells out the assumptions, considerations, opportunities and constraints; and provides evaluations and possible alternatives which mould the Structure Plan.

The proposals for action include the creation of Environmental Enhancement Zones, supported by the creation of a National Open Space System. The Natural Environmental Zones and the Open Space System will house a walkable footpath system that includes both stairways and footbridges.

The Structure Plan identifies heritage sites which require conservation, restoration, and improved access. Proposals for linking religious precincts with open spaces will make them more accessible as heritage "walks" and "drives" to enhance people's experience of these treasures. The proposal specially stresses the urgency to enhance the Tashichho Dzong, the Memorial Chorten, Prayer Wheels, and the Heritage Villages.

The most compelling structural aspect of the plan is the proposed **traffic and circulation system**, which lays out the Urban Corridor, arterial roads and connector roads.

The Structure Plan **emphasises mixed-use development** taking into consideration Dharma - the essence of Bhutanese life. The **precincts** facilitate and promote various activities that make up daily lives. They also provide for religious functions and other residential "house holding" activities to be carried out without disruption by industrial activities or intensive retailing and wholesaling.

The Structure Plan's housing strategy is to design houses which can accommodate future residents in an affordable, compact and walkable neighbourhood.

It also sets aside **space for social services and amenities**, so that future city dwellers will have easy access to basic healthcare and educational facilities. It has provisions to facilitate the distribution of portable water, electricity and communication networks, plus a systematic plan for storm water drainage, sewage drainage and solid waste disposal.

Available data on land, geological formation, landscape, land use and others were collected and analysed, with the plans formulated in line with the development vision. The TSP identifies urban issues, and actions plans that include the presentation of detailed proposals for each of the urban sectors like transport, water supply, drainage and sewerage, solid waste management, housing and transport.

The TSP is specifically designed to cater to the needs of its future inhabitants. It divides the municipality into 15 **urban villages (UV)** instead of the 16 as proposed by doing away with Dechenchholing Palace UV. According to settlement pattern, population concentration, environmental assets and geographical features, each Urban Village is composed of one or two **Local Area Plans (LAP)**.

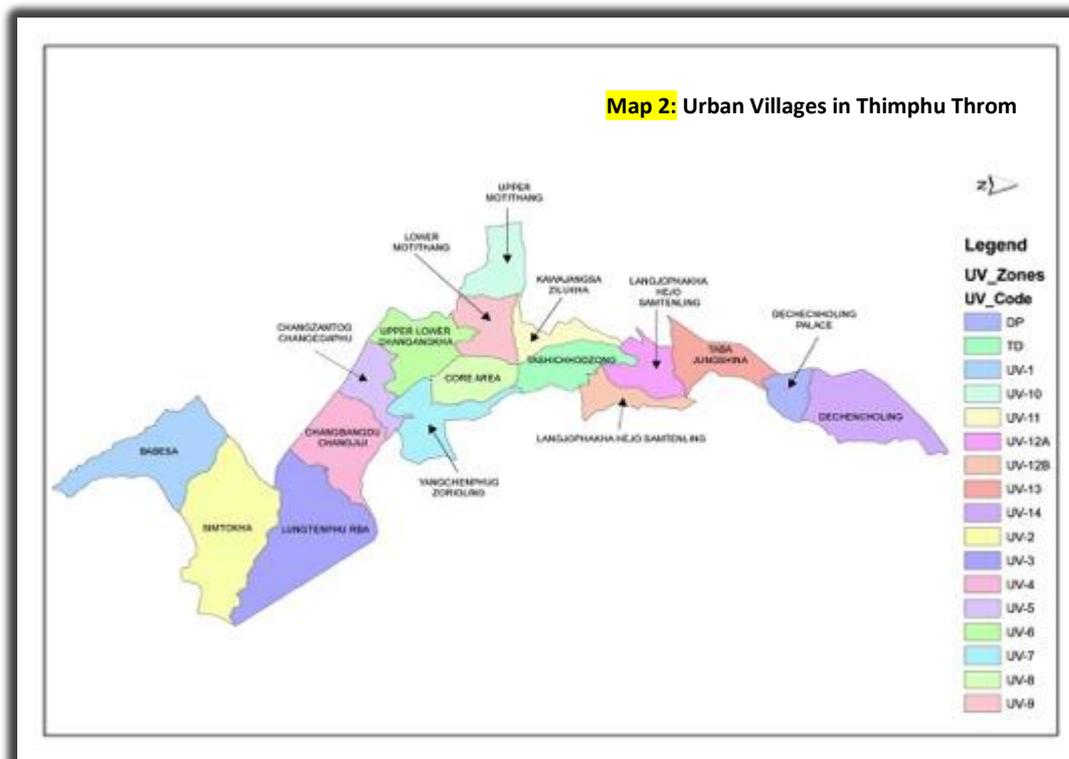


Table 1: Status of LAP Implementation as of 2017

Sl. No	Name of Local Area Plans	Plan Implementation Status
1	Dechenchholing LAP	Completed
2	Langjophakha LAP	Completed
3	Taba LAP	Ongoing
4	Hejo-Samteling LAP	Unimplemented
5	Jungshina LAP	Unimplemented
6	Zilukha LAP	Completed
7	Core Area	Completed
8	Motithang (Upper)	On-going
9	Motithang (Lower)	On-going
10	Changzamtog LAP (middle)	On-going
11	Lower Changzamtog LAP	On-going
12	Upper Changzamtog LAP	On-going
13	Chang Khorlo (JDWNRH & NPPF colony)	On-going
14	Chang Gangay (swimming pool area & parts of Changangkha)	On-going
15	Chang Gumji (parts of Changangkha & Bangladesh Embassy)	On-going

16	Changbangdu LAP	Completed
17	Chang Jangsa (previous workshop area)	Unplanned
18	Yangchenphu	On-going
19	Lungtenphu LAP	Completed
20	Babesa LAP	Completed
21	Simtokha LAP	Completed
22	Serbithang LAP	On-going

Table 2: Stock Taking of TSP Activities from 2002 to 2017

Urban Villages	Area in Acres	Plan Status	Remarks
Babesa (include Serbithang)	588.30 (Includes Serbithang)	Approved by City Committee in 2005	<ul style="list-style-type: none"> - Basic infrastructure implemented through ADB funding. - Area earmarked for National Stadium was scrapped and in its stead an IT park has been developed. - Neighbourhood Node has been scrapped and land allocated to individuals since the initial plan was prepared without complete land information. - Currently Thromde is developing a truck parking on river buffers - The LAP does not provide outlet for natural gullies indicated in TSP - Serbithang LAP not yet developed. However, formation cutting of roads are done - Pedestrian bridge not yet constructed
Semtokha	815.44	Approved by City Committee in 2007	<ul style="list-style-type: none"> - Basic infrastructure implemented through ADB funding. - Pressure for high density development in E4 areas - Bus Terminal (City Gateway) not yet implemented due to land acquisition/compensation issue - Warehouse precinct not yet developed - The existing Sewerage Treatment Plan (STP) will be de-commissioned but the future use of land not yet decided
Lungtenphug	825.28	Approved by City Committee in 2004	<ul style="list-style-type: none"> - Basic infrastructure implemented through ADB funding. - Neighbourhood Node not yet developed due to financing problem - Many identified non-conforming use still existing along Wang Chhu - The private bridge constructed is not as per the TSP - Pedestrian bridge not yet constructed - Community School constructed
Changbangdu (includes	Is included in Changjiji UV	Approved by City Committee in 2007	<ul style="list-style-type: none"> - Basic infrastructure implemented through ADB funding.

Changji and Changzamtok)			<ul style="list-style-type: none"> - Exhibition area not yet realised and the area has also reduced - Pedestrian bridge not yet constructed - Land use change and increase in density - APIC project and express-way realignment underway - Army sawmill and Chundu sawmill still operating - Shortage of potable water supply - Community school constructed
Core Area	240.70	Approved by CCM in 2003	<ul style="list-style-type: none"> - Norzin Lam pedestrianisation initiated but not yet implemented - 3 multi-level parking under construction - BOD not yet relocated - 108 steps not realised - Chubachhu circle deviation - Tarayana deviation - Existing non-conforming use (desho factory)
Hejo-Samtenling	504.60 (includes Langjophakha)	Approved by City Committee on 7/3/2008	<ul style="list-style-type: none"> - LAP implementation ongoing. - BOC constructing recreational facilities - NN not developed - Diplomatic enclave pending - Supreme Court construction deviation
Langjophakha	(included in Hejo-Samtenling UV)	Approved by the City Committee in 2007	<ul style="list-style-type: none"> - Basic infrastructure implemented through the WB funding - The plan went through a major change before implementation due to mismatch of land and cadastral information - Ludrong Park developed with recreational facilities - New bridge construction completed
Taba	559.10 (includes Jongshina)	Approved by City Committee in 2005 (Lower Taba)	<ul style="list-style-type: none"> - Basic infrastructure under implementation through the WB funding. However, upper Taba is left out due to land pooling issue - NN is not a part of the WB funding - Community school constructed
Dechencholing (Siluna)	515.10 (includes Changtagang and RBG)	Approved by the City Committee in 2005	<ul style="list-style-type: none"> - Basic infrastructure implemented through the WB funding - NN not yet developed. - Sewerage facility is also extended to RBG colony - Community school not yet constructed
Jungshina	Included in Taba UV	Plan finalised but not approved	<ul style="list-style-type: none"> - Basic infrastructure not yet implemented due to funding problem - Bridge to connect Pamtsho and Taba completed - Inter bus terminal not constructed - Stock exchange building not yet constructed - Community school constructed

			<ul style="list-style-type: none"> - Pressure in E4 area to allow high density development - Still grappling with land pooling issue with a few landowners - Proposed workshop area conundrum
Kawangjangsa	170.40 (includes Zilukha)	No LAP	<ul style="list-style-type: none"> - Basic infrastructure plan prepared and approved - Implementation happening in an ad-hoc manner
Lower Motithang	251.40	No LAP	<ul style="list-style-type: none"> - Basic infrastructure plan prepared and approved - Implementation happening in an ad-hoc manner
Upper Motithang	241.90	No LAP	<ul style="list-style-type: none"> - Basic infrastructure plan prepared and approved - Implementation happening in an ad-hoc manner
Zilukha	1.6 Area	Action Plan	<ul style="list-style-type: none"> - Basic infrastructure plan prepared, approved and implemented
Changangkha	366.00	No LAP	<ul style="list-style-type: none"> - Basic infrastructure plan prepared and approved - Implementation happening in an ad-hoc manner

Other general observations and findings applicable to all the above listed areas are:

1. Inaction in endowment areas
2. Ad-hoc development immediately outside Thromde boundaries
3. A major issue of quality, monitoring enforcement and maintenance of infrastructure
4. Incentives for Traditional village – Incentives for protected zones approved by the Cabinet. However, Trust Fund for Thimphu Thromde is not instituted.
5. Private schools and institutions coming up all over places without consideration for land use, traffic circulation and added pressure on existing infrastructures and services
6. Thromde Tshogde makes decisions that are technical in nature
7. Parking on the main roads due to weak implementation and noncompliance to DCR.
8. Issue of existing non-conforming uses
9. Utility lines affecting or impairing the infrastructure services
10. General coordination issue (both external and internal)
11. Thimphu Central Water Supply Scheme under implementation.
12. Solid waste, storm water, sewerage and water supply and its network system – infrastructure technology services and funds and issues
13. Lack of human resource capacity (both in terms of quality and number)
14. Lack of financial and technical resources to implement all the components of TSP
15. The TSP is good, however, implementation, information dissemination, assimilation and ownership are weak.
16. Governance issues
17. Change in plan and decisions and external interference affecting the implementation
18. Lack of a proper land and property market

Note: LAP = Local Area Plan; UV = Urban Village. Basic infrastructure includes roads, footpaths, drainage, sewerage, and water supply.

1.7 Relevance of national PPPs and international agreements to TSP

Numerous development policies and programmes are in place that affect the TSP, as well as projects and initiatives—both in the pipeline and being proposed. It is thus essential for decision-makers to be adequately informed when considering development proposals, and to see how they might support or conflict with the TSP.

As such, the integration of environmental considerations into various PPPs is reviewed, along with an exploration of how the SEA can be used to design sustainable PPPs that would be relevant to implementation of the TSP.

Details of this exercise are provided in [Annex 2](#), which examines the commitments made by Bhutan with regard to the management of natural resources and categories of land, meeting social needs and obligation, or for municipal and land use planning purposes. These commitments include international treaties and accords/conventions, national level strategies and policies, and plans and programmes developed in the region.

2 APPROACH AND METHODOLOGY

The methodology for this SEA was adopted through a dynamic and flexible process to suit the local context. It focuses on key issues related to implementation of the TSP including possible future impacts on its wider ecosystem, given that the various developmental activities within the plan consume huge amounts of financial, natural, technical and human resources.

2.1 Scenario approach

A scenario approach was adopted to provide a long-term outlook for developmental options in the TSP, with realistic projections of potential pathways for planners, decision- and policy-makers based on population trends. The following are brief outlines of the various scenario options that were initially deliberated upon by the Core Team as an important aspect of scenario-building.

Scenario based on assessment of TSP: This scenario would entail assessment of progress in the implementation of TSP with a review of what was initially planned and what has happened to date. This would include assessment of changes in the natural environment (vegetation, biodiversity, habitat, water resources and system, open spaces, geography and topography, etc.); changes in LAP contents and boundary, land use, neighbourhood nodes, urban hubs, urban corridor, developed plots, density of population, etc.; and changes in relevant legislations and policies. As this scenario would consider only assessment of developmental changes, some of which are not in keeping with the TSP, it would be difficult to set alternatives on the change of the TSP itself which is an approved plan and still under implementation.

Population scenarios: The level of developmental infrastructure and services required is determined to a large extent by the population. A rapidly growing population (as experienced by Thimphu) has major social and environmental impact; hence, several population scenarios were discussed.

1. **Maintain the current population:** A scenario whereby the current population is maintained would be desirable if it were possible, as this would make it easier to maintain the current state of the environment and to pursue sustainable development. It would however be practically difficult, requiring high-level decision and massive interventions go keep the city's population from increasing, and was therefore not considered.
2. **Decrease in population:** A scenario whereby the current population is decreased, if it were possible, would constitute a long-term strategy at the national level. While such a scenario may translate into minimised environmental degradation and balanced national development, it is practically unlikely and was therefore not considered.
3. **Increase in population:** Considering the current pace of population growth and economic development in Thimphu Throm, further population increase is inevitable.

A scenario that accounts for this trend would be the most realistic and would also mean that essential changes to the TSP may be required to address the consequent social and environmental issues. Hence, a scenario that incorporates increasing population over time was considered for this SEA.

2.2 Temporal framework

As mentioned, this SEA is conducted for a scenario with increased population, within which two population scenarios are considered:

- i. A population of 160,000 within a time horizon of 2027 as per the TSP projections; and
- ii. A population of 200,000 within a time horizon of 2027 as per the 2005 Population and Housing Census of Bhutan (PHCB) projections.

The two scenarios are not to be seen as extreme standpoints, but rather as the range of realistic options from a business-as-usual perspective to more ambitious changes to current trends. While the TSP spans over a 25-year duration from 2002 to 2027, the temporal framework of this SEA spans over a 10-year duration from 2017 to 2027.

Thimphu Throm's population according to the PHCB 2005 was 79,185. With an annual growth rate of 5.2 percent applied to the PHCB figures, the projected population in 2027 is close to 200,000.

In contrast, the TSP—which had been prepared prior to the conduct of the PHCB—used the municipal census of 2000 as the base for its projections. As such, a five percent compounded increment on the municipal census figure of 43,476 projects a population of 162,327 for 2027. Based on these figures, the TSP proposes strategies such as densification and new development on public land and vacant land to absorb the additional population, and indicates the total population that can be accommodated by each Urban Village.

Table 3 below presents these population projections in further detail based on the PHCB 2005 and the TSP. For additional reference, it also includes a set of projections based on a growth rate of 12.6 percent as suggested by the *Bhutan National Urbanization Strategy 2008* (BNUS 2008).

Table 3: Computation of Population Projections for Thimphu Thromde

Year	Population Projection		
	TSP Approach	Projections as per PHCB Approach	BNUS Approach
	Growth rate 5%	Growth Rate 5.2%	Growth Rate 12.6%
	5%	5.2%	12.6%
2000	43,479		
2001	45,653		
2002	47,936		
2003	50,332		

2004	52,849		
2005	55,491	79,185	79,185
2006	58,266		89,162
2007	61,179		100,397
2008	64,238		113,047
2009	67,450		127,291
2010	70,823		143,329
2011	74,364	85,468	161,389
2012	78,082	89,912	181,724
2013	81,986	94,588	204,621
2014	86,085	99,506	230,403
2015	90,390	104,681	259,434
2016	94,909	110,124	292,123
2017	99,655	115,851	328,930
2018	104,637	121,875	370,375
2019	109,869	128,212	417,043
2020	115,363	134,879	469,590
2021	121,131	141,893	528,758
2022	127,187	149,271	595,382
2023	133,547	157,034	670,400
2024	140,224	165,199	754,870
2025	147,235	173,790	849,984
2026	154,597	182,827	957,082
2027	162,327	192,443	1,077,674
	160,000	200,000	

2.3 Process methodology

SEA good practices and principles, with adjustments to suit the local context, were applied for this assessment as outlined below.

Screening: The SEA multi-sectoral Core Team comprising representatives from Thimphu Thromde (TT), Ministry of Works and Human Settlement (MoWHS), Gross National Happiness Commission (GNHC), National Environment Commission Secretariat (NECS), National Land Commission Secretariat (NLCS), and the United Nations Development Programme (UNDP) deliberated and decided upon the geographic scope of the SEA as earlier described— i.e. to focus on the 26 km² area under the jurisdiction of Thimphu Thromde and covered by the TSP, together with its large hinterland of valleys connecting Thimphu to Paro, Punakha and Wangduephodrang. The SEA Process was initially led by NECS and later transferred to MoWHS.

Scoping: The scoping phase for undertaking the SEA was initiated by the NECS in 2016. This resulted in a scoping report⁷ based on the following processes and components, which have been further built upon over the course of conducting the SEA:

- *Review of relevant literature* including international treaties and accords/conventions; national level policies, regulations and strategies; plans for Thimphu, Paro, Punakha and Wangduephodrang; and Environmental Impact Assessments (EIAs) and specialist studies undertaken in the SEA area;
- *Analysis of Bhutan's laws, policies, regulations, strategies and action plans*, as well as permit requirements insofar as they are relevant to the issues at hand;
- *Consultations with interested and affected parties* (I&APs) including MoWHS, Thimphu Thromde, NEC, relevant parastatal, concerned groups, and technical experts through workshops, Focus Group Discussions (FGDs), interviews and electronic communications;
- Taking into account *more recent developments* such as the release of new regulations or new proposed PPPs or projects; and
- Securing the *opinions of experts*.

Technical analysis: The SEA undertakes a systematic technical analysis of environmental, planning and socio-economic issues in Thimphu Thromde, using secondary data available with different agencies as well as past studies and documents. It looks into the measures required to incorporate environmental and planning considerations into the TSP for two population scenarios; scrutinises how governance can be enhanced for effective implementation of the TSP; examines how coordination among different stakeholders can be improved; and considers the need for strategic interventions at the higher planning and institutional levels.

The analyses and proposed recommendations presented in subsequent sections of this report are synthesised into institutional and planning strategies, with concrete proposals for the short, medium and long-term to be incorporated in the formulation and implementation of spatial planning or local area plans of the TSP. These analyses will also assist in the preparation of future structural plans and guide other Thromdes in the preparation and implementation of their structure plans.

Identification of alternatives and selection of the preferred alternative: Alternatives to be considered and analysed during the SEA process were identified and selected by process participants/stakeholders. All alternatives proposed by the floor during plenary sessions were initially noted. Participants then reduced the number of proposed alternatives through discussion and vote. Thereafter, only those alternatives retained were analysed through scenario construction, risk analysis, and expert judgment.

⁷ MoWHS and NECS, RGOB. *Scoping Report for Undertaking a Strategic Environmental Assessment (SEA) of the Thimphu Structure Plan*. Prepared by Professor Barry Dalal-Clayton, Environment and Development Services, UK. December 2016.

On completing the prospective analysis, the multi-sectoral Core Team with the technical support of the Korea Environment Institute (KEI) decided on two alternatives based on two population growth scenarios. A series of core group meetings that discussed the findings and analyses of the SEA concluded that the current TSP can accommodate population growth as identified in both the scenarios; as such the core group accepted both the alternatives with their respective sets of recommendations.

Communication and stakeholder consultation: To ensure transparency and inclusiveness in the SEA process, a communication and stakeholder consultation plan was designed and is under implementation. A wide range of stakeholders are included in a participatory process for the SEA through the conduct of face-to-face consultations as well as communications via the web portal, and print, broadcast and social media.

The first round of consultations reached out to relevant government agencies, civil society organisations, media, the business community and others from the private sector. The second round reached out to local communities residing within Thimphu Thromde. Thereafter, relevant technical experts such as key urban planners, environmentalists, transport specialists, lawyers, policymakers, among others were consulted bilaterally for technical guidance and validation in their respective fields.

The findings and outcomes of the SEA will continue to be shared and discussed with all stakeholders, in order to take its recommendations forward. As such, the communication and stakeholder consultation plan will continue to be implemented.

3 MAPPING AND PRIORITISATION OF THEMATIC ISSUES

Although urbanisation is an inevitable consequence and also an indicator of improved socioeconomic development, the rapid pace at which it has been occurring across Thimphu Throm should be viewed with some alarm. This is because the space available to accommodate the increasing population is limited, and development activities have spilled over along its peripheries and valleys.

New building constructions and sprawl can be seen spreading in the northern and southern ends of the Thromde. A burgeoning urban population has created pressure on the natural environment, resulting in air, land and water pollution, water shortages, increasing volumes and types of municipal waste, traffic and building congestion, land degradation, etc.

3.1 Projection of issues

A stakeholder workshop held during the scoping phase identified a range of projects, activities and developments underway and planned within the Thromde. It also identified themes and impacts (both negative and positive) that need to be addressed. Accordingly, the core team carried out a mapping of the SEA thematic areas in context to the TSP, also covering other thematic areas such as governance and culture which are important in Bhutan's context. These thematic areas are:

Economy

- High cost of living
- Speculation and high land price
- Existence of underutilised/unproductive land
- Increased revenue
- Urban agriculture

Social

- Rapid population growth and in-migration
- Limited/inadequate public amenities
- Inadequate basic services
- Shortage of affordable housing
- Circulation and public transport and mobility
- Congestion (traffic, housing, etc.)
- Urban poverty including slum growth
- Unemployment (especially youth unemployment)
- Poor quality and maintenance of infrastructures
- Increasing crime rates
- Increase in lifestyle diseases
- Non-motorised transport
- Access to information
- No/weak ownership of public goods

Culture

- Decreasing community vitality and psychological well being

- Loss of cultural landscapes and traditional architecture
- Cultural dilution

Environment

- Registered land along the high hazard zones (rivers and steep slopes)
- Deterioration of air, water and soil quality
- Carrying capacity of infrastructure to meet the challenges of climate change and disaster.
- Pressure on water catchment areas and watersheds
- Encroachment into fragile ecosystem
- Increasing surface run-off (hydrology)
- Loss of biodiversity/ecosystem habitat
- Lack of open spaces and recreational facilities
- Increasing waste
- Increasing energy use
- Climate change

Governance

- Monotonous house construction
- Ageing and deteriorating infrastructures
- Most institutions housed in Thimphu
- Weak implementing capacity of the institutions
- Poor coordination (internal and external) and isolated interventions
- Weak division of roles and responsibilities and enforcement
- Weak public service delivery and customer care services
- Existing non-conforming uses
- Importance of clustering of services/businesses of similar nature
- Important project(s) (at national level) not yet implemented

3.2 Relevance of TSP goals to national and international goals

SEA frameworks have the potential to allow the principles of sustainability to be carried down from policies to individual projects (Partidário, 1999). They contribute to sustainability by providing broader environmental vision; ensuring early consideration of environmental issues; anticipating environmental impacts; facilitating environmentally-oriented chain of actions; and contributing to integrated policy-making and planning.

To provide a comprehensive assessment of the issues, it was important to assess whether the existing principles of intelligent urbanism of the TSP is in keeping with the sustainability-oriented frameworks provided by the GNH domains, the Sustainable Development Goals (SDG goals), and the 12th FYP and its NKRA. In this respect, a matrix with GNH domains, NKRA, SDG Goals and the principles of TSP were mapped and compared to analyse their synergies. This matrix is presented in [Annex 3](#).

This exercise helped ascertain if any critical components had been left out in the TSP that requires to be addressed within the broad parameters of the GNH Domains. It showed that in essence the existing TSP Principles are in keeping with national goals and the SDGs.

The findings from the mapping exercise was grouped into four broad themes, for the purpose of this SEA:

1. Living standard
2. Community vitality
3. Good governance
4. Environment and disaster resilience

3.3 Prioritisation of focus areas

Against each of the themes emerging from the mapping exercise—i.e. living standard, community vitality, good governance, and environment and disaster resilience—the essential parameters were listed to enable the identification of focus areas for further assessment and analysis.

Table 4: Prioritisation of focus areas

THEMES	Focus Area
Living Standard	Affordable housing
	Quality of basic infrastructures (Water, storm water, sewerage, transport, housing)
	Quality of education
	Quality of health
	Economy vitality
Community Vitality	Land use and Neighbourhood Node
	Culture, Heritage & Tradition
	Public Spaces & Recreational Facilities
	Psychological Well being
Good Governance	Community Partnership
	Public Participation
	Institutional Coordination
	Public Service Delivery
Environment & Disaster Resilience	Pollution
	Biodiversity
	Disaster
	Waste
	Energy Efficiency

The assessment of these focus areas and the prioritisation of the issues was carried out by the multi-sectoral-Core Team, based on the sustainability perspective and validated during public consultation meetings.

Table 5: Prioritised list of focus area based on Sustainability

	Sustainability Objective	Sustainability Issue	Relevancy	Evidence rational	TSP Reflection	Urgency (1-5) *5 being more urgent
1	Living Standard	Affordable housing	High	More than 30% of the income goes to house rent.	YES (TSP has provisioned spaces for Housing)	5
		Quality of basic infrastructures	High	Most of the infrastructure should be upgraded/built	YES (resource constraints)	5
		Quality of education	Medium	Locations of schools are not well distributed. Quality of beyond the scope of TSP. Infrastructure for facilitating education needs to be enhanced.	YES (NN facilitates provisions for Schools)	3
		Quality of health	Medium	Sports and leisure facilities are limited. Pedestrians and Cyclist unfriendly.	YES (NN and Parks are identified in TSP)	2
		Economy vitality	High	Unemployment rate is high	NO (TSP does not address unemployment issue directly)	3
2	Community Vitality	Neighbourhood Node	High	NN will cater to all basic infrastructures for a particular area. Currently NN are not developed. Few identified area as NN are lost	YES (TSP has provisions for NN)	5
		Culture, Heritage & Tradition	High	Accessibility to heritage sites is poor. Subsidies for Traditional Villages are poor.	YES (TV are supposed to receive subsidies viz. land pooling)	4
		Public Spaces & Recreational Facilities	High	Insufficient recreational sites. Ones accessible are not affordable	YES (TSP has enough recreational sites)	4
		Psychological Well being	Low	Because TSP is physical plan. Impact to psychological wellbeing is indirect	YES (Provision of Parks and recreational facilities could enhance psychological wellbeing)	2
3	Good Governance	Community Partnership	High	Partnership is limited. Needs more advocacy	YES (TSP encourages 75% endorsement)	4
		Public Participation	High	less participation during public consultation meetings	YES (Any LAP undergo at least 3 Public Consultation meetings)	3

		Institutional Coordination	High	Lack coordination amongst utility and service providers like Electricity, Telecom, Water, Land, Sewerage, etc	NO	5
		Public Service Delivery	High	Most of the services need to be provided online.	YES (Covered under DCR)	4
4	Environment	Pollution	Medium	Air, water, land and noise pollution have localised. Emission from automobile have impact on air quality but other type of pollution does not relate directly	YES (emission from automobile mentioned in TSP)	3
		Biodiversity	High	Most wet lands and environmentally sensitive areas are developed	YES (TSP restricts development in environmentally sensitive areas)	2
		Disaster	High	Most of the houses built prior to 2000 are not seismic resilient. Thimphu is also prone to flash flood. Corridors along the Thimphu river are not strictly implemented.	YES (TSP restricts development with buffer areas) TSP does not cover seismic resilient constructions	3
		Waste	High	Landfill site is operating beyond its capacity and new site has not been identified yet. Wastes from automobile workshops are not managed. Waste collection services and facilities are not efficient	YES (TSP has identified mechanism to manage waste but TSP has no provision for new waste disposal facilities)	4
		Energy Efficiency	High	Most of the houses are not built in an energy-efficient manner. Standards and guidelines are currently in process	NO	1

The priority ranking clearly shows that affordable housing, quality infrastructure, development of neighbourhood nodes, and institutional coordination are ranked as the most urgent sustainability issues for the Thromde. Waste, public service delivery, community partnership, culture, heritage and tradition, and public spaces and recreational facilities were listed as the next most urgent issues.

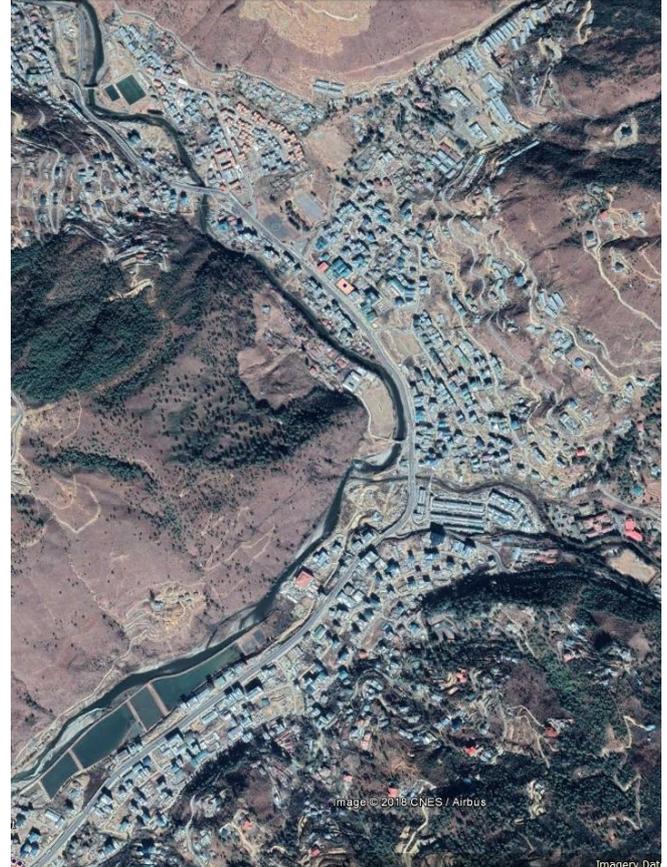
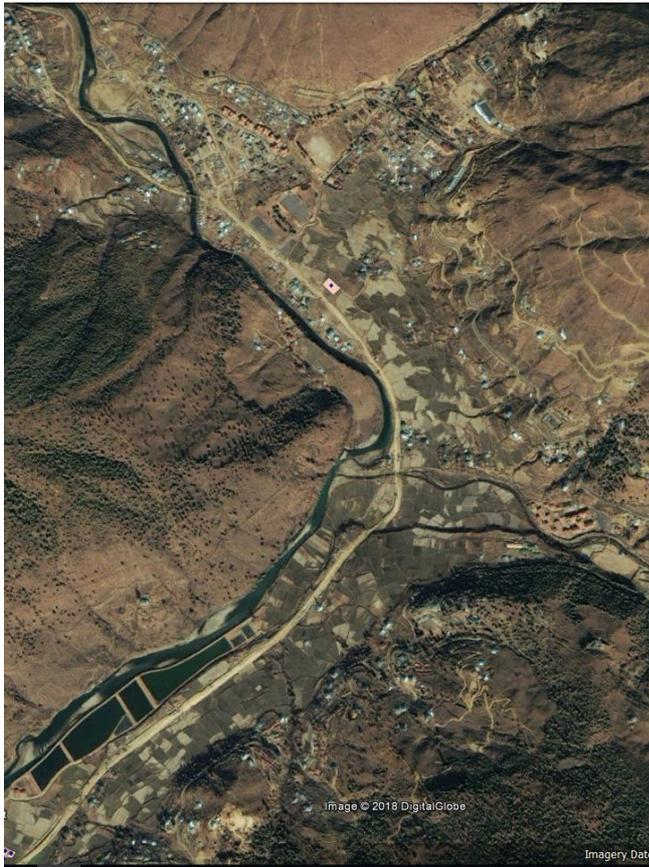
4 ANALYSIS OF THEMATIC ISSUES

As presented in the preceding sections, the issues considered for further analysis in this SEA have been prioritised using a holistic approach. Assessment of each of the thematic issues follow the approach and methodology as earlier described, based on which recommendations are provided.

4.1 Land use



Maps 3 & 4: Thimphu in 2003 and 2018 (Source: Google map)



Maps 5 & 6: A comparison (Babesa, Simtokha, Lungtenphu,

4.1.1 Current baseline

Upon scrutiny of the *TSP 2002-2027*, the proper area break-up against the 21 designated precincts are not reflected in it. There is, however, a map in AutoCAD format showing the various precincts with proper colour coding but it is extremely difficult to measure the area from this map as it has multiple overlapping lines. While the TSP was handed over to the Thromde in 2003 upon its approval by the Council of Cabinet Ministers (CCM), georeferenced/rectified ortho/satellite images were not provided. The only satellite image of Thimphu Thromde was procured in 2011, and without the latest satellite imagery it is difficult to carry out change detection in the land-use pattern using GIS software.

Given this limitation, the *TSP 2002-2027*—which was updated in 2015 with land-use changes that has happened on the ground—is compared with the land-use area break-up that existed before the preparation of the TSP. [Table 6](#) shows a comparative analysis of land-use in 2002 and 2017 under the TSP.

Table 6: A comparative analysis of land-use in 2002 and 2017 under the TSP

Precinct	2002 Area_SqKm	%	2017 Area_SqKm	%	Change
D_Dzong	1.028	4.26%	0.986	4.12%	-0.14%
E1_Environment Conversation	2.704	11.19%	1.076	4.49%	-6.70%
E2_Forest Environment	4.359	18.04%	3.953	16.51%	-1.54%
E3_Agricultural Environment	0.182	0.76%	0.026	0.11%	-0.65%
E4_Agri_based Environment	3.961	16.40%	5.103	21.31%	4.92%
EN_Endowment	0.812	3.36%	1.870	7.81%	4.45%
G1_National Open Green Space	0.726	3.00%	0.335	1.40%	-1.61%
G2_Green Space System	0.807	3.34%	0.552	2.30%	-1.04%
H_Heritage	0.358	1.48%	0.225	0.94%	-0.54%
I_Institutional	0.319	1.55%	1.820	7.60%	6.05%
NN_Neighbourhood Node	0.210	0.87%	0.081	0.34%	-0.53%
R_Royal Use	0.187	0.77%	0.220	0.92%	0.14%
RBG_RBG Area	0.817	3.38%	0.817	3.41%	0.03%
TV_Traditional Village	0.259	1.07%	0.232	0.97%	-0.10%
UC_Urban Core	0.547	2.26%	0.469	1.96%	-0.30%
UH_Urban Hub	0.086	0.36%	0.113	0.47%	0.11%
UV1_Commercial	0.794	3.29%	0.271	1.13%	-2.15%
UV2-LD_Residential Low Density	0.272	1.12%	0.129	0.54%	-0.58%
UV2_Residential	5.329	22.06%	5.416	22.62%	0.56%
UV2-I_Residential	n/a		1.522	6.36%	n/a
UV2-II_Residential	n/a		0.488	2.04%	n/a
UV2-MD_Residential Medium Density	n/a		3.406	14.22%	n/a
K_Knowledge City	0.055	0.23%	n/a		n/a
SP_Public use & Service areas	n/a		0.253	1.06%	1.06%
RC_Restrictions Corridor	0.347	1.43%	n/a		-1.43%

The following changes are observed when comparing the land-use maps of 2002 ([Map 7](#)) and 2017 ([Map 8](#)):

- i. **Environmental Conservation (E1) Precincts:** The E1 precinct area i.e. the green buffer zones along major streams (Olarong Chhu, Ngabirong Chhu, Samteling Chhu, and Chuba Chhu and other minor streams) has reduced. This is attributed in part to a 2006 Government Directive to reduce the buffer areas along the streams from 30 meters to 15 meters; the rationale was that there were many affected private landowners as well as the existence of fully developed infrastructures prior to the development and approval of the TSP. This document is provided as [Annex 4](#).

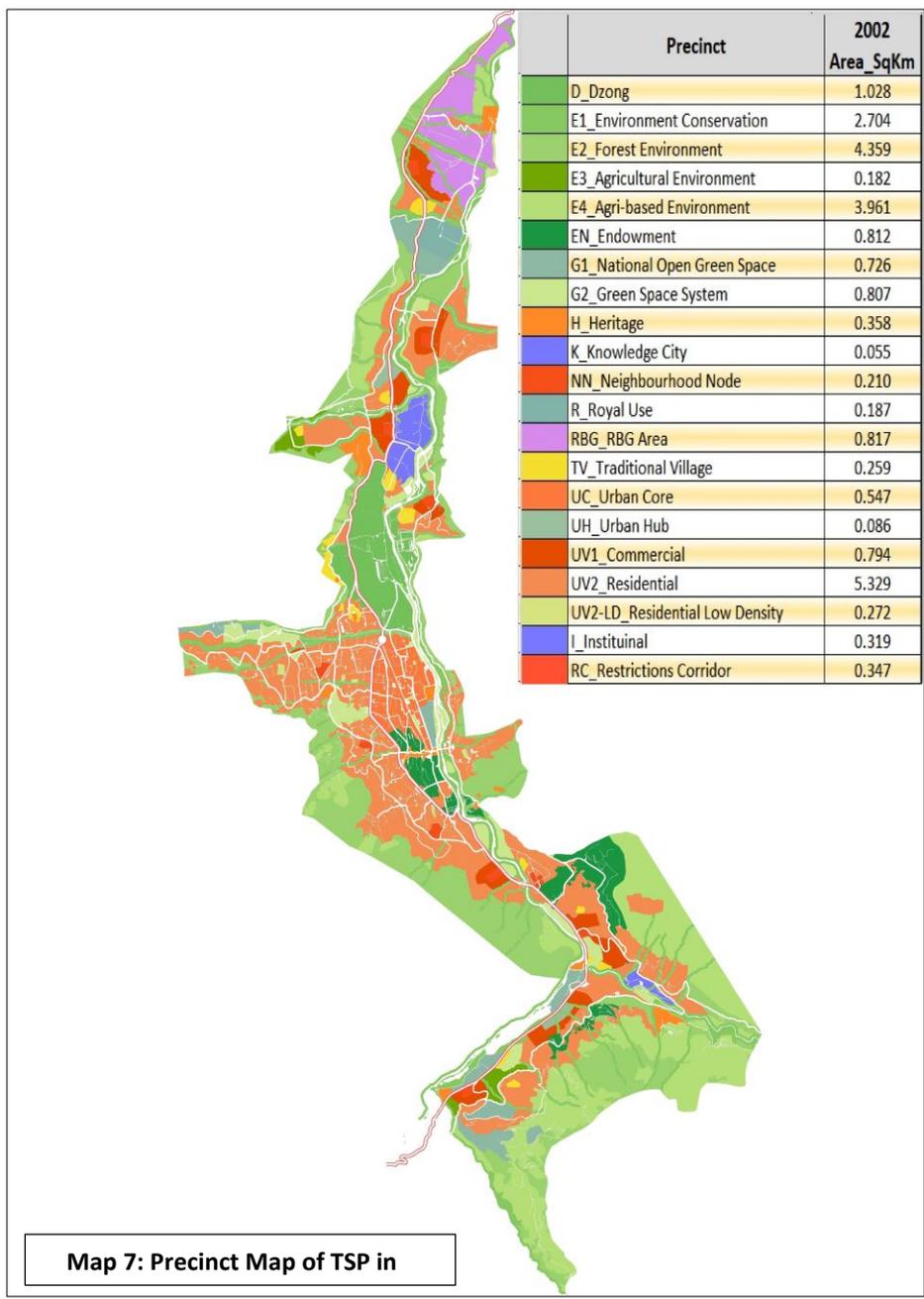
The reduction is further attributed to the non-existence of proper land ownership records at the time of preparing the TSP, which resulted in the forceful conversion of earlier earmarked wetlands (marshy land) in south of Babesa into other precincts. An exception is the Green Buffer along Wang Chhu, which has remained the same. The Forest and Conservation Act of 1995 prohibits the felling of trees within a 30-meter corridor of the river or any streams to protect the watercourses, and any type of construction along the boundaries of Wang Chhu and streams is prohibited.

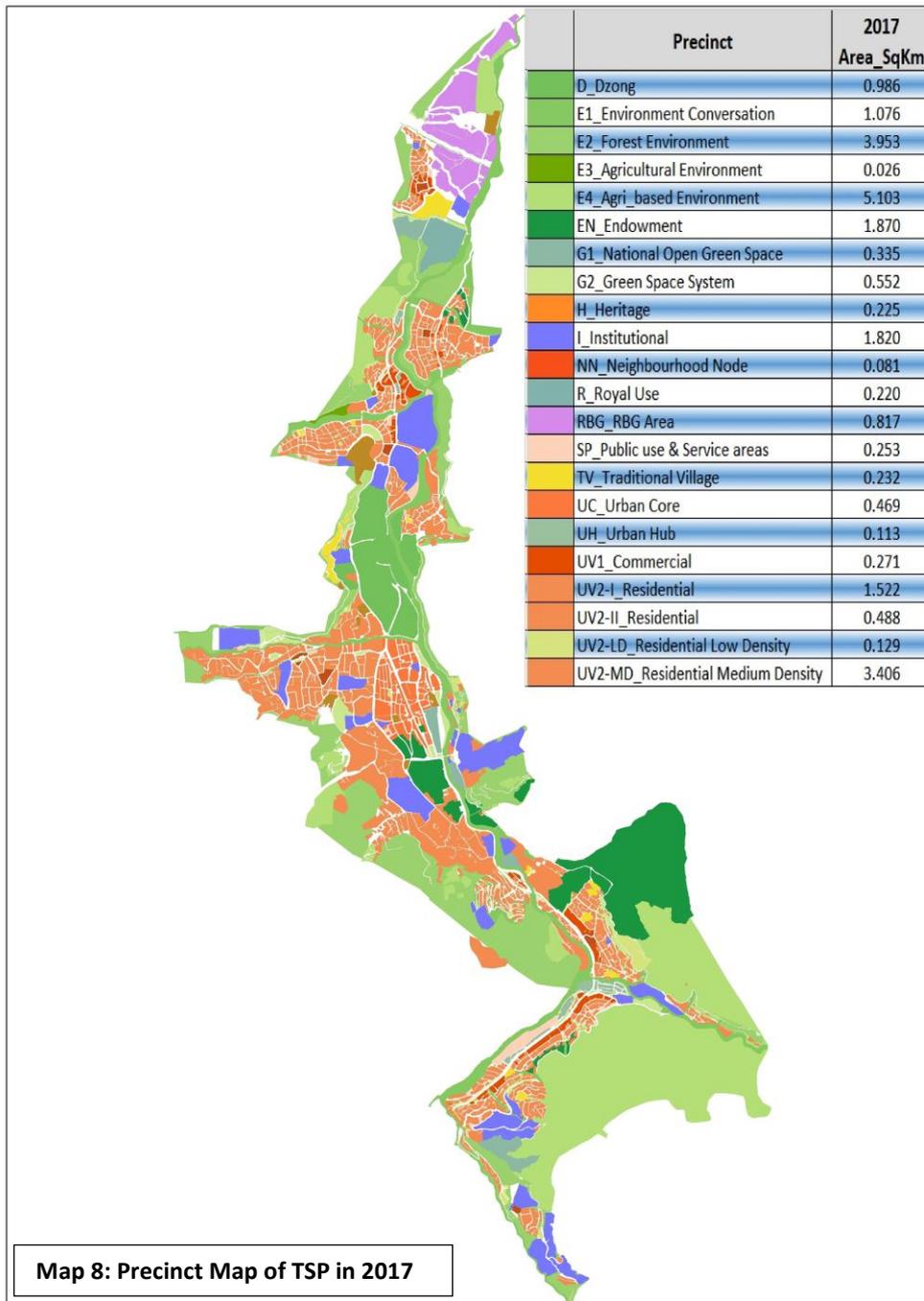
- ii. **Forest Environment (E2) Precincts:** Pockets of E2 or the forest precincts have reduced mainly because of conversion of E2 private lands to *Agri-based Environment (E4)* precinct. During the preparation of the TSP, all the forest areas were designated as E2. However, during its implementation, private lands falling in E2 were converted to E4 precincts. This was done on the basis of discretionary power accorded to Thimphu Thromde by the Development Control Regulation and though public consultation, given that some of the forest areas were under private ownership. As such, there has been an increase in the precinct area of E4 since 2002.
- iii. **Agricultural Environment (E3) Precincts:** E3 or the Agricultural precincts have reduced drastically mainly owing to conversion of the earmarked E3 precincts to residential use. A case in point is the wetlands (paddy fields) in Babesa and Semtokha. Although the approved initial plan was to retain those wetlands as agricultural land, public pressure and the government's acceptance of it led to their conversion into residential areas.
- iv. **Agri-based Environment E4 Precincts:** Pockets of E4 precincts have changed to either Urban Village Medium Density (UV2 MD) or Low Density Urban Village (UV2 LD). This is due to pressure from the landowners based on the feasibility and landscape. Moreover, as more detailed LAPs were developed, the E4 precincts were rationalised and up- or down-graded to UV2 precincts based on detailed topographical survey. In recent times the E4 or agri-based precincts, which include agri-processing and warehousing, are facing increasing pressure from developmental activities.

Current conditions show 20 percent building to land ratio in an area of over 1000m². The general lack of space for expansion renders the E4 precinct the only area available. However, as these are usually on higher grounds with a gradient of more than 20 percent, there are several risks such as the loss of water retention capacities, increased risks of landslides, and soil erosion caused by access roads leading up to isolated localities being developed.

- v. Though the actual land uses have not changed on the ground, the updated TSP map of 2015 has changed all the schools and institutional areas which are not designated as institutional precincts in the TSP map. Earlier, the TSP reflects those areas as UV 2.
- vi. **Parks and Open Spaces:** The Thromde currently has a number of recreational areas. These include the Serbithang botanical garden, Motithang park, Motithang takin preserve, Eco park near Youth village, Changlimithang ground, Chang Jiji ground, RIM ground, Clock Tower square, Centenary Park, Thai Pavilion, Zilukha Rhododendron garden, Ludrong park, Bhutan Olympic Committee (BOC) archery range, golf course near Tashichho Dzong, RBG golf course, Royal garden, YHS athletic ground, Changjiji football ground and Chang Jiji park. A slight decrease in area is observed in terms of open spaces, probably due to non-incorporation of the 13-acre Babesa Community Park in the LAP with the Ministry of Information and Communications (MoIC) taking ownership of it to build the IT park.

- vii. **Traditional Villages (TV) Precinct):** Although 14 Traditional Villages were identified in the TSP, only a handful exist today. Given a lack of financial incentive, it has become extremely difficult for both the homeowners in the TV Precinct and the Government to maintain the area as such. However, efforts are being made with the framing of the *Guidelines on Incentives for Management of Protected Zones within Thromde Boundary 2016* by the MoWHS in collaboration with other relevant agencies.
- viii. **Road coverage:** At the time of the TSP preparation, road coverage was planned at 10 percent against the 20 percent normative figure practiced elsewhere in flat urban areas. As shown in the comparative analysis in Table 6, the percentage of road coverage has already crossed the desired 10 percent limit, with paved roads alone standing at 7.95 percent.





In addition, some physical observations are also noted as follows:

- i. **Conflicting uses:** The continued presence of some sawmills, as well as furniture and wood-based industries, within the Thromde Thromde boundary is in conflict with the TSP's recommendation to relocate them outside of the Thromde. Several private schools have also been established in locations that are not appropriate, without consideration of the traffic congestion, infrastructure availability, pressure on existing infrastructure and services related to water, drainage, sewerage, storm water, road, parking, utilities, and other factors.

- ii. **Defence Area developments:** While the TSP proposes the Defence Area to be shifted to the National Capital Region (NCR) for security reasons, this has not happened; instead, more permanent structures have been built to accommodate offices and personnel
- iii. **Additional building floors:** Approvals have been granted by the Thimphu Thromde Tshogde to allow the conversion of habitable attic spaces into a full floor, thereby allowing the construction of an additional floor. This has occurred in all except E4 precincts with the latter not granted such approvals in accordance with an executive order of the then CCM. The result of the approvals has been an increase in density as well as population accommodation capacity of the TSP, which in turn has put more pressure on the already strained city infrastructure and services
- iv. **Parking along the roads:** Owing to non-compliance by building owners and weak implementation by the relevant authorities regarding parking space requirements, road users' right of way is taken up with building tenants parking on the City roads.
- v. **Wholesale marketing and storage:** As wholesale shops require an immense number of delivery trucks to service them, the wholesale market in Thimphu will eventually have to be shifted out of the city. Likewise, the weekend market attracts numerous trucks and transit population, and may also need to be shifted to a wholesale market and storage town. From these dedicated locations, neighbourhood retailers would get their supply and the nearby districts of Paro, Punakha and Wangduephodrang can also be serviced. There would also be a new City Market in the urban core for fish, meats and vegetables.
- vi. **Urban villages:** Villages already exist within the TSP and must be taken into consideration. These will have to be seen as part of the urban region. People working in the city will begin to settle in these settlements. In other world capitals, such settlements begin to grow in an unplanned manner long before planning catches up with them. It would make sense to designate some of these as Satellite Towns and to begin planning rudimentary urban infrastructure. They may be considered as nascent urban villages and developed along the same pattern as other neighbourhoods within the city. Providing a bus link would be a major benefit to these villages. Other infrastructure could follow. These Urban Villages may ultimately take population/ congestion pressure off from the city centre.

During the public and stakeholder consultation meetings, it was voiced that there is a need to review and reduce the number of precincts in the TSP. There are 22 precincts in the TSP, giving rise to confusion among the implementers and land owners. For instance, UV1 has subcategory 1, 1A, 2, 2B, 3 and 4 and with only a fine line of difference between them.

4.1.2 Recommendations

- 1) The development of recreational spaces need to be prioritised in order to facilitate a good quality of life in the City. The absence of well-designed and organised recreational spaces limits opportunities for local residents to gather, socialise and

experience such fundamental elements of wholesome living. Without these spaces, residents will have to travel further for such facilities; and children will be compelled to play in unsafe areas such as the streets, parking lots and vacant plots, or they will be confined in their apartments leading to an environment of urban isolation.

- 2) Green and open spaces also need to be identified. It would be practical to develop those areas of State-owned land that are small and irregular as open and green spaces for the public to use.
- 3) Plantations along the rivers and streams will also need to be carried out in consultation with the Water and Shed Management Division of the Ministry of Agriculture and Forests (MoAF). Various sources of funding will need to be explored, including domestic resource mobilisation, as well as the engagement of CSOs, private sector and the local communities (as further covered under the thematic section on governance).
- 4) As recommended during the first public consultation meeting for the SEA, the Thromde Office would need to initiate the relocation of sawmills from within the Thromde area.
- 5) Thimphu Thromde and all relevant agencies should continue protecting the hill slopes, river basin and other ecological fragile areas as also highlighted the TSP 2002-2027.
- 6) The relevant agencies will need to provide proper guidelines for the establishment of private schools within the Thromde, including identification of locations, and also ensure their proper implementation through strengthened coordination.
- 7) Thimphu Thromde, in consultation with MoWHS, may need to review the number of precincts category as proposed in the TSP 2002-2027 and explore how this can be simplified to facilitate more effective implementation of the plan.

4.2 Neighbourhood nodes

4.2.1 Current Baseline

As per the TSP, each LAP has a Neighbourhood Node (NN), which will provide most of the essential facilities for local residents at walkable distances. In essence, the concept of neighbourhood nodes is to have a central core that acts as the service and commercial centre for the urban villages. This is expected to help decongest the urban core by reducing traffic and curbing infrastructure development. It is also expected to benefit local residents by reducing their need to travel to the City core for basic services, thereby reducing fuel consumption and air pollution.

NNs are conceived to be a predominantly pedestrian regime, providing an environment where people can leisurely shop, take walks, meet friends, and where children can play. Other features are to include shaded waiting areas with proper sitting arrangements, and facilities for persons with disabilities. [Table 7](#) lists the basic amenities that NNs should generally have.

Table 7: Amenities in Neighbourhood Nodes

Amenities	Details	Area (in square meters)
Shops	20 nos.	965
Crèche	One	150
Police Station	One	190*
City Express Bus-stop	With waiting facilities for passengers and parking for 5 buses	1611.92
Neighbourhood Clinic	Primary diagnostic facilities, no of in-patient facilities	150
Taxi Stand	Twenty vehicles	1218.60
Post-box Pavilion	800 boxes	150
Automobile Service Station/petrol pump	Preliminary service facilities	1083.67*

Over time, however, many of the areas identified as NNs have been lost and could not be retained for their intended use. The few that have been retained are in Dechenchholing, Taba, Hejo-Samteling, and Lungtenphu LAPs. [Map 9](#) shows the location of neighbourhood nodes in the various LAPs.

4.2.2 Recommendations

Given the expected benefits of neighbourhood nodes, it is strongly recommended these be developed as was planned. To do so, it will be essential for all stakeholders including the central agencies as well as those in the private sector to take ownership of the TSP, and to coordinate for the provision of the proposed infrastructure and services based on the needs of the respective LAPs.

Towards this end, Thimphu Thromde will need to:

- 1) Sensitise the relevant stakeholders about areas allocated for NNs in each of LAPs and advocate their implementation with the relevant agencies;

- 2) Initiate the project formulation with relevant service providers; and
- 3) Explore various implementation modalities such as the Public Private Partnership model, or the development of relevant infrastructure by service providers, among others.

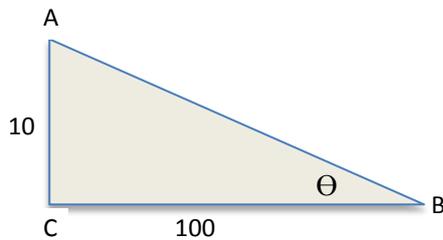
Map 9: Location of Neighbourhood



4.3 Slope Analysis

4.3.1 Current baseline

Slope is the inclination of surface with respect to horizontal surface. It can be expressed or denoted in three ways, as is suitable to the context i.e. either in percentage (%), ratio (x:y) or degree (°). This is illustrated below, showing the slope or inclination of a surface AB.



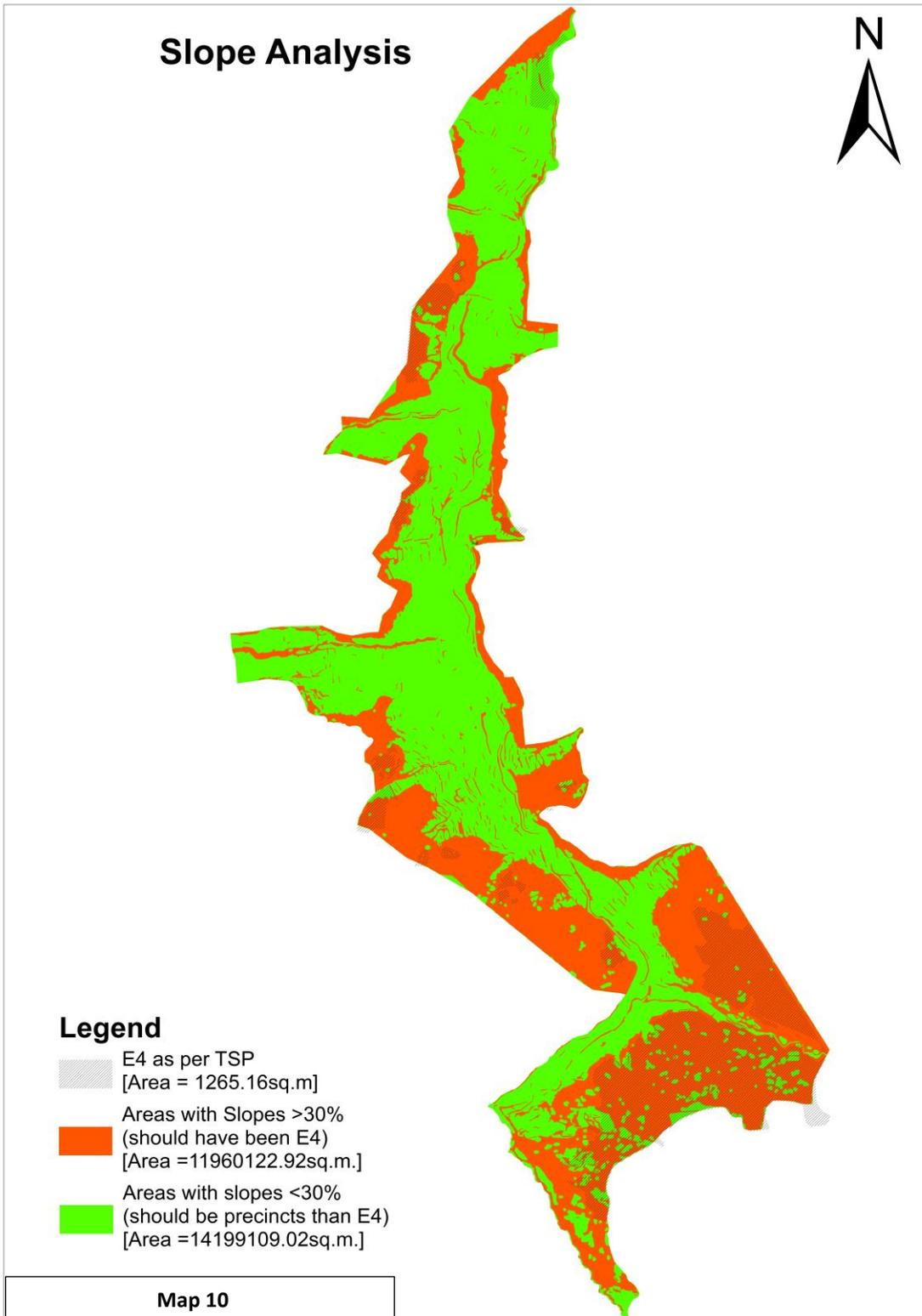
1.1	Percentage (%)	1.2	Ratio (x:y)	1.3	Degree (°)
1.4	10 vertical <i>per 100</i> horizontal i.e. 10 %	1.5	10 vertical by 100 horizontal 1.6 10:100 i.e. 1:10	1.7	$\theta = \tan^{-1}(10/100)\theta = 5.7^\circ$
1.8	for 30% slope	1.9	3:10		$\theta = 16.69^\circ$

The slope analysis for the TSP provides five categories of slope range:

- Flat Terrain (0-5%)
- Gradual Slopes (5-10%)
- Moderate Slopes (10-20%)
- Steep Slope (20-30%)
- Very Steep Slope (>30%)

The TSP describes areas with slopes greater than 30 percent as very steep. It states that such areas are not suitable for development as it would involve cutting land and clearing vegetation, leading to soil erosion and landslides as well as many other adverse impacts. It therefore prescribes terrains with slopes more than 30 percent to be maintained as E4 precinct—i.e. an agri-based environment where the minimum size of plots is to be 0.25 acres and coverage to be 20 percent, so as to ensure minimum human activities and to avert adverse environmental effects.

However, when the precinct or land use map is super-imposed with the slope analysis map, there are cases where the UV-2 LD and UV-2 MD have slopes greater than 30 percent, as well as E4 areas with slopes less than 30 percent. These findings are shown in maps 10, 11, 12 and 13 below.



Given such mismatch in land use and precinct categorisation, unmonitored development is taking place on the ground. Pictures 1, 2 and 3 show a sample of such developments, whereby four- to five-storied buildings have been constructed in either UV-2 MD or UV-2LD precincts that are in fact located on very steep slopes and should have been classified and implemented as E4 precinct (to allow only one or two storied structures covering only 20 percent of the area).

Some of the apparent impacts of such unguided development are slope failure and landslides caused by excessive excavation, further leading to disruption of water supply, road blockages, and power disruption.

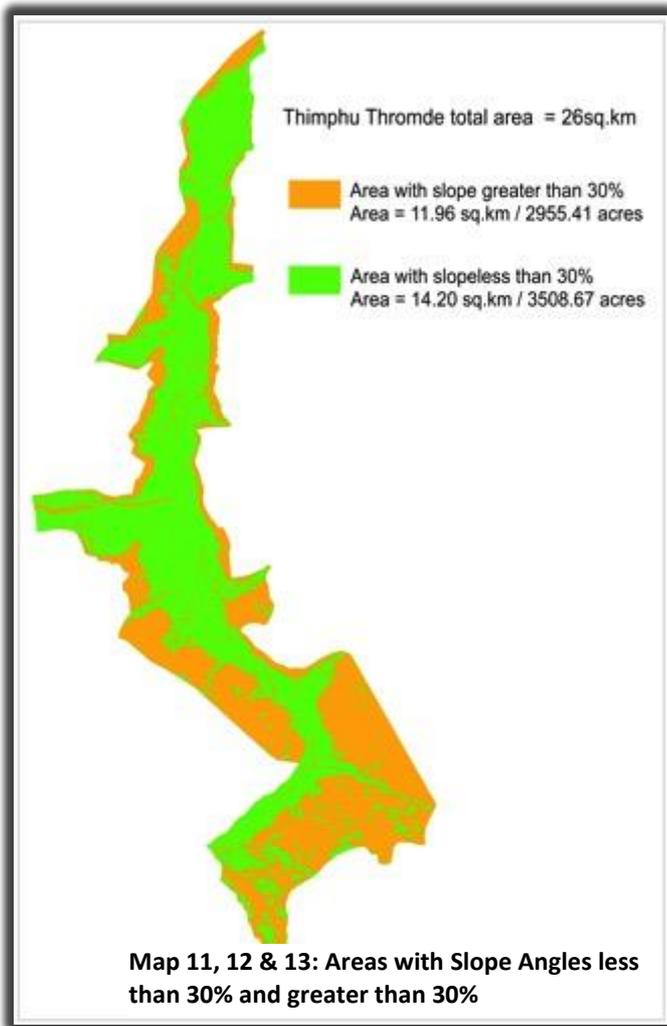


Pictures 1, 2 & 3: Unmonitored developments on very steep slope leading to infrastructure and environmental damage

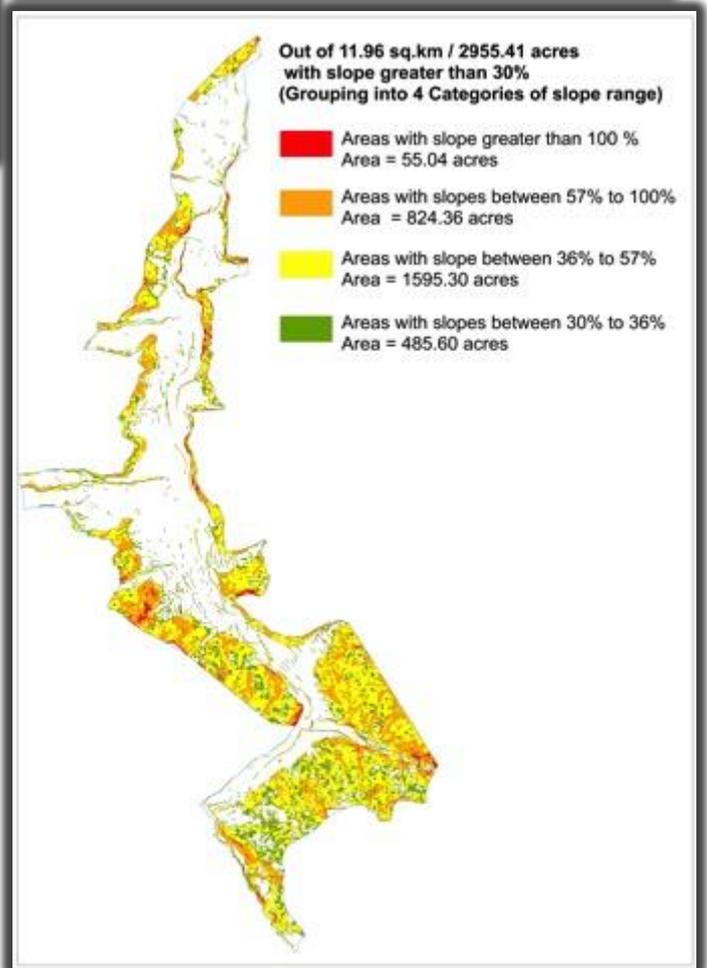
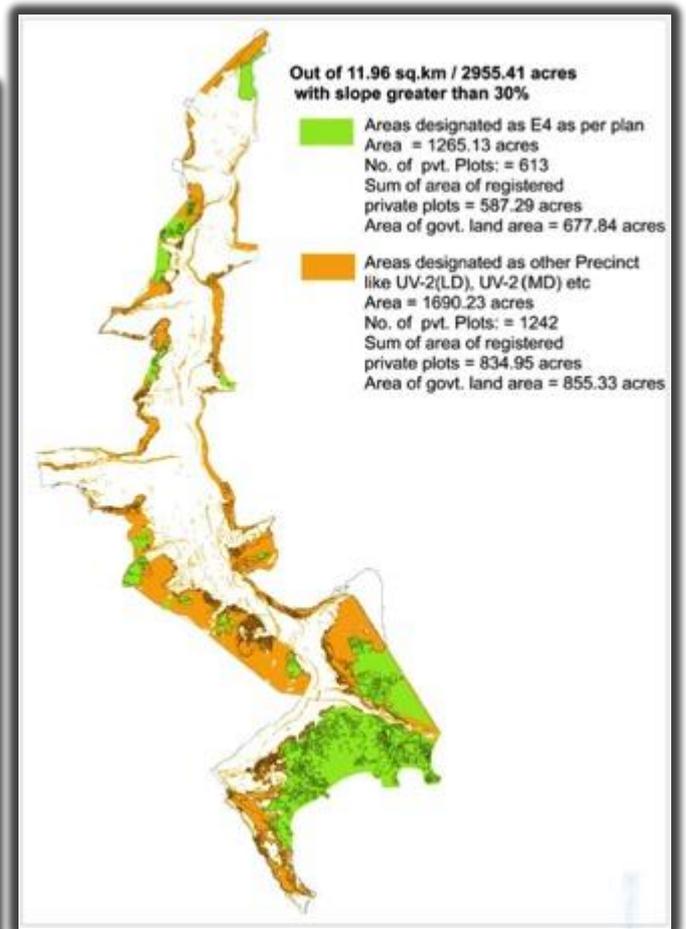
4.3.2 Recommendations

Given that the developments as described above are detrimental to the environment, economy and community, strong oversight and monitoring mechanisms are of utmost importance. Among other measures that should be explored, it will be important to:

- 1) Physically inspect the ground realities of constructions taking place, some of which are even observed on slopes of almost 45° (i.e. 100 percent), and to disallow such activities
- 2) Review and reassign the land-use or precinct classification, based on a **thorough slope and aspect analysis** and geo-technical studies. While other factors like vicinity to the urban centres is important, slope aspects need be taken seriously to safeguard the environment which ultimately affects the economy and community. Following the slope and geo-technological studies and analysis, clear **regulations and guidelines** on development on steep slopes and very steep slopes need to be drafted and implemented.



Map 11, 12 & 13: Areas with Slope Angles less than 30% and greater than 30%



4.4 Infrastructure Development

4.4.1 Water

4.4.1.1 Current baseline

Thimphu Thromde's water supply system consists of surface water intakes, intake structures, raw water transmission mains, boreholes, water treatment plants, storage tanks, submersible, centrifugal and booster pumps and distribution lines. The Thromde's drinking water system follows an operation procedure, where surface water is collected and taken through raw water transmission mains to a water supply facility for treatment, storage, disinfection and distribution.

Table 8 presents a summary of the water supply system in Thimphu Thromde and its distribution areas. About 30 percent of the service area receives 24 hours supply while the remaining 70 percent receives intermittent supply ranging from three to eight hours a day.

Table 8: Summary of Water Supply System in Thimphu Thromde

	Water Treatment Plant (WTP)	Capacity of WTP (in MLD or Million Liter per Day)	Year of Establishment	Raw Water Intake	Supply Area
1	Motithang	6.5 MLD	1960s	Pumla, Damilum and Phajoding streams	Upper and lower Motithang, Changangkha, NPPF colony, JDWNRH area, Yangchenphu, and PWD colony
2	Jungshina	6.5 MLD	2004	Trail race of Mini Hydro Power Project of BPC	Langjophakha, Core area, Centenary Farmer's Market, Hejo, Zilukha, JDWNRH area Changzamtok, Changjiji, Tashichodzung, and Chubachu.
3	Bore Hole (3 nos.)	1.2 MLD	2012	Wangchu (infiltrated water)	Changzamtog
4	Dechenchholing	1.4 MLD	2014	Dechenphu stream	Dechenchholing
5	Chamgang (Meygepang)	6.5 MLD	2014	Chamgang stream	Its distribution network was designed and constructed to operate at 13 MLD. It covers most of the southern LAPS of Thimphu Thromde i.e. Changbangdu, Lungtenphu, Olakha, Semtokha and Babesa.
6	Taba	10 MLD (First Phase of Central Water Scheme)	Ongoing Project, to be commissioned in 2019	Dodena	Taba, Jungshina-Pamtsho, Hejo – Samtelling, Langjophakha, Yangchenphu, and Changjiji housing colony area. It is also expected to augment the existing water supply shortages for the urban core area especially Norzin Lam once the present distribution lines to the core areas are realigned.

7	Central Water Supply Scheme	The total capacity is 15 MLD. The construction of treatment plant would be carried out in two phases, 10 MLD in the first phase (i.e ongoing Taba WTP, see sl. 6) and 5 MLD in the second phase.	Ongoing Project, to be commissioned in 2019	<p>Dodena</p> <p>The site for raw water intake of the proposed central water supply system is proposed upstream of Dodena along Thimphu chhu which is about 18km from core city area at an elevation of about 2729m above mean sea level north of Thimphu Thromde in Thimphu Dzongkhag.</p>	<p>Through the main transmission pipeline of the Central Water Supply Scheme, water will be supplied to the Taba Water Treatment plant. The main transmission trunk line will connect to the existing tanks at Langjophaka, Yangchenphu and Changjiji on the left bank and Hejo-Samteling, Pamtsho, Jungshina. While the central water supply scheme shall cater to LAPs of Taba, Pamtsho and Jungshina, it will also augment the existing water supply to the core city up to the planned period. The water demand of Begana and Kabisa areas shall also be covered.</p> <p>The water supply in the core area in particular shall be improved through integration of the existing network with the proposed central water supply scheme. The water supply presently being supplied to Yangchenphug area directly from Kuengacholing reservoir at Motithang shall be substituted by the proposed central water supply scheme. Similarly, other areas including the Changjiji housing colony shall be substituted through the new scheme. The water supply to Langjophaka is presently pumped from Jungshina water treatment plant. Besides serving as an alternative water supply to Langjophaka, its coverage of this area will save water that can be used to augment water supply to core area.</p>
8	Community water supplies				<p>Extended areas of North and South Thimphu are catered through community water supply systems managed by the communities themselves. Lubding and Semtokha areas above the old highway is supplied by separate water sources. It is being planned that the existing community water supply shall be improved and integrated with Thromde water supply system which shall augment the expected supply by at least 3 to 4 MLD</p>

The Thromde's existing network of water supply does not cover the entire area within its boundary, especially where settlements are small and scattered. Households that are not provided water by the Thromde depend on the community water supply system or individual private sources. In some cases, households have placed their water pipes along the storm water drainage networks. This is not safe as it could lead to contamination of drinking water. Therefore, Thimphu Thromde is working towards providing water to all residents through the Central Water Supply Scheme in the 12th FYP.

Meanwhile, the increasing population and rapid urbanisation poses challenges to ensuring an adequate and efficient water treatment and supply system. Issues include irregular water supply; inadequate and unequal water distribution; illegal tapping of water and diversion of water supply; and loss of huge volumes of water due to wastage, unsustainable consumption, and an old water distribution network system.

In addition, as shown in [Table 9](#), there is a high presence of Escherichia coli (E. coli) at certain sections of the Wang Chhu where contamination occurs due to leaking septic tanks, wastewater treatment discharge, and animal waste. This is particularly so along those areas with settlements near the Wang Chhu.

Table 9: Water Quality Results for Wang Chhu

Site Name	Date	DO(mg/l)	DO(%)	Conductivity (uS/cm)	PH(0-14)	Total Coliform
Centenary Farmer's market	18/07/17	8.28	77.5	140.5	8.29	>2419.6
	3/8/2017	6.7	64.4	144.7	8.23	1011.2
	21/08/17	6.86	64.5	147	8.25	1011.2
	12/9/2017	8.3	79.1	145.5	8.22	1011.2
Centenary Park	18/07/17	8.21	77.8	139.7	8.05	1732.9
	3/8/2017	8.23	6.68	64.3	13.6	1011.2
	21/08/17	8.23	6.82	64.3	12.7	1011.2
	12/9/2017	8.18	8.19	78.5	13.5	1011.2
Dodena	18/07/17	7.73	73.1	183.4	8.44	27.5
	3/8/2017	7.06	63.9	185.3	8.3	8.5
	21/08/17	7.13	63.8	186.3	8.33	61.3
	12/9/2017	8.57	76.6	191.5	8.31	272.3
Dechen Zam	18/07/17	8.29	77.6	8.29	8.24	1732.9
	3/8/2017	6.72	64.4	145.9	8.23	378.4
	21/08/17	6.89	64.5	148.48	8.26	1011.2
	12/9/2017	8.39	79.89	145.8	8.24	1011.2

Source: Wangchu Water Keepers (December, 2017), Clean Bhutan

4.4.1.2 Scenario 1: Population of 160,000

The total capacity of Thimphu Thromde's Water Treatment Plant (WTP) is 22.1 MLD, taking into account those that are in operation in 2017 i.e. Motithang, Jungshina, Bore Hole (three numbers), Dechencholing and Chamgang. After the commissioning of the Taba WTP, the total capacity will increase to 32.1 MLD. The quantity of water being fed through the community water supply systems is not included in the projection. The projection assumes maximum water intake potential of the design intakes for the WTPs.

Table 10: Scenario 1 - Projection of Water Supply and Demand

Rationale	Year	Population	Supply				Demand		Surplus/Deficit (MLD)
			Design Capacity of WTP (MLD)	30% NRW	Fire fighting demand (5)%	Actual Capacity of WTP (MLD)	Actual demand as per 150lpcd (MLD)	Per capita water consumption (lpcd)	
Projection for Scenario 1: Population of 160,000	2017	99655	22.1	6.6	1.1	14.4	14.9	150.0	-0.6
	2020	115000	32.1	9.6	1.6	20.9	17.3	150.0	3.6
	2027	160000	32.1	9.6	1.6	20.9	24.0	150.0	-3.1

The average domestic consumption is 150 litres per person per day⁸, while the percentage of non-revenue water (NRW) is 30 percent⁹ and water demand for firefighting is five percent¹⁰. NRW is the difference between water production and metered consumption; it also includes the volume of water produced and lost through leaks, overflowing tanks, pipe breakdowns, disruptions, inaccurate meters, illegal connections, etc. Adding 30 percent NRW and five percent firefighting demand on 150 litres, the per capita water consumption works out to 195 litres per day.

Considering a five percent population growth rate, the population of Thimphu Thromde in 2017 is projected at 99,655. Its water supply is projected to have a deficit of 0.6 MLD. However, this projected deficit is expected to reduce by the year 2019 as the 10 MLD Taba WTP will be commissioned (which forms part of the Thromde's central water supply scheme), and water supply is expected to meet demand. As presented in Table 10 for Scenario 1, it is projected that by 2020 there will be a surplus of water supply by 3.6 MLD as the Central Water Supply Scheme would be commissioned.

By 2027, a deficit of 3.1 MLD is projected. However, the commissioning of Thimphu Thromde's second phase construction of a 5 MLD central water supply scheme is expected meet the total water demand of the population by 2027.

Irrespective of water-supply deficit or surplus, there is a need for sustainable consumption of water at all levels i.e. individual, household, community, institutional, commercial and industrial. As unsustainable consumption will ultimately lead to the depletion of natural water resources, conservation is extremely important.

4.4.1.3 Recommendation

In Scenario 1, as per the projection, water supply will be able to meet demand. However, this is from a quantity perspective assuming that the water treatment plant will function to its full capacity with continuous inflow from source or raw water intake. There are other

⁸ Thimphu City Development Strategy 2008

⁹ (Dorji and Choden, 2016)

¹⁰ (WSD, 2017)

unforeseen factors that could lead to decrease in supply considering, for example, unsustainable consumption patterns, or the drying up of water sources/watershed/water catchment areas as a result of climate change . Therefore, the following are recommended:

- 1) ***Develop Water Supply Master Plan for Thimphu Thromde:*** As the planning of water supply schemes in Thimphu Thromde is done for each LAP, the disjointed augmentation of water supply poses risks to efficient planning and provision of infrastructure and services. Technical evaluation for water source alternatives or optimisation of distribution network is required. Hence, there is a need to formulate a long-term infrastructure plan for water. The Master Plan should also include improvement of water infrastructure like rehabilitating existing WTPs, reservoirs and network.
- 2) ***Watershed Protection:*** Water sources located at wetlands and catchment areas must be preserved and protected. Adaptation measures for climate change such as securing water sources through impounding and catchment protection will be necessary. In consultation with the Ministry of Agriculture and Forests (MoAF), detailed studies will need to be conducted on the size of the area, stability, flow fluctuations, etc. for catchment areas. In particular, greater attention is required to protect the Wang Chhu as a priority; and besides protecting and conserving the natural streams of Thimphu, it would also be useful to consider reviving them in consultation with the Watershed Management Division (WMD) under Department of Forests and Park Services, MoAF.

Conservation and protection of watershed needs to be done in a holistic manner taking into account all aspects that are likely to influence the quality and quantity of water flowing from the watershed. This infers that approaches to management need to be multidisciplinary and integrated, whereby, the WMD will take the lead and come up with site specific management interventions through development of Integrated Watershed Management Plans including scoping studies on drying water sources.

Thimphu Thromde could consider the Pay for Environmental Services (PES) approach for integrated water resource management, as a means to sustain and secure water resources for the growing population. PES has a useful role in achieving a long-term, sustainable, integrated and adaptive water resource management. However, detailed studies are recommended to be conducted prior to initiating the PES schemes.

- 3) ***Diagnostic study on optimisation of existing water distribution scheme:*** Water network and water distribution system should be strengthened or reorganised in order to have an optimisation of network through rehabilitation of the existing WTPs, reservoirs and network; augmentation, upgradation and strengthening of existing distribution network and house connections; and regular preventive and corrective operation and maintenance.

The percentage of NRW needs to be reduced and this can be done by inculcating the habit of conserving water and reducing wastage through the use of water-saving

devices and enhanced technology; reducing water losses in the system by replacing old pipes, pumps etc.; and by Thimphu Thromde conducting strict monitoring of illegal connections and leakages, and enforcing appropriate penalties. Towards this end, it will be necessary to conduct a diagnostic study on optimisation of existing water distribution scheme.

- 4) **24x7 equitable distribution of water supply:** Water should be supplied 24x7 with equitable distribution to the population. The quality of water should meet the minimum standards as specified in the *Bhutan Drinking Water Quality Standards (2016)* to ensure safe drinking water. There is need to have strict water quality testing and monitoring of the water quality by the competent authorities.
- 5) **Demand management measures:** In order to promote water savings on the demand side, Thimphu Thromde should implement 100 percent metering and revisit the water tariff. This would encourage users to reduce wastage and adopt water saving devices, and to facilitate this process it will be necessary to conduct regular awareness programmes.
- 6) **Public Private Partnership:** Thimphu Thromde may consider using the Public Private Partnership (PPP) model in order to implement an efficient water network system with low operational and management costs, and for sustainable production. However, it is recommended that detailed studies be conducted prior to initiating the PPP model for water supply and distribution system.

4.4.1.4 Scenario 2: Population of 200,000

Table 11: Scenario 2 - Projection of Water Supply and Demand

Rationale	Year	Population	Supply				Demand		
			Design Capacity of WTP (MLD)	30 % NRW	Fire fighting demand (5-10)%	Actual Capacity of WTP (MLD)	Actual demand (MLD)	Per capita demand taken (lpcd)	Surplus/ Deficit (MLD)
Projection for Scenario 2: Population of 200,000	2017	115000	22.1	6.6	1.1	14.4	17.3	150.0	-2.9
	2020	142763	32.1	9.6	1.6	20.9	21.4	150.0	-0.5
	2027	200000	32.1	9.6	1.6	20.9	30.0	150.0	-9.1

The projections in Scenario 2 for water demand and supply are calculated using the same approach as in Scenario 1. The results, however, indicate water supply deficits unlike in Scenario 1. The projection of water supply in 2017 shows a deficit of 2.9 MLD, and in 2020 a deficit of 0.5 MLD. Assuming that water conservation and management measures are undertaken, the deficit is negligible.

However, by 2027 it is estimated that water supply will be deficient by 9.1 MLD for a projected population of 200,000. As Thimphu Thromde will have the Central Water Supply

Scheme of 10 MLD which is to be commissioned by 2019, and an additional 5 MLD will be augmented based on need in later years, the deficit thereafter is projected to be 4.1 MLD.

4.4.1.5 Recommendation

Based on the projections of Scenario 2, the water supply deficit is negligible. In order to cater to the population, additional water treatment plant and intake structures are not required to be planned and constructed. The deficit can be managed *if* recommendations from Scenario 1 are implemented. However, to meet the deficit of 4.1 MLD for the population of 200,000 by the year 2027, there is a need to construct a 4.1 MLD Water treatment plant. In addition, ***all recommendations listed under Scenario 1 are applicable for Scenario 2.***

4.4.2 Sewerage

1.1.1.1 Current baseline

While 98 percent of the households in Thimphu Thromde have access to improved sanitation,¹¹ some disadvantaged groups and construction laborers who live in temporary settlements do not have such access. The sewerage system for the Thromde has a centralised wastewater treatment plant located in Babesa. It uses a lagoon system (stabilisation pond process) spanning 15 acres with a total network length of approximately 22 km. The whole system is operated by gravity.

The core town area, consisting of about 30 percent of total households, is connected to the treatment plant. The remaining households rely on septic tanks which is cost effective and appropriate for low-density urban and rural areas. The Thromde has two cesspool trucks to provide de-sludging services. Sludge from the septic tanks is safely disposed into the sewer network. With the completion of additional sewerage network constructions, the proportion of households connected to the Sewage Treatment Plant (STP) will increase. Table 12 shows the number of buildings currently connected to the sewer.

Table 12: Number of Buildings Connected to Sewer as of 2017

Sl.No	Location	Number of buildings connected to sewer
1	Changjiji Colony	71
2	NPPF Colony	43
3	RBP Colony	55
4	Langjophakha	36
5	Dechencholing	56
6	Olakha & Lungtenphu	186
7	Olakha Workshop area	54
8	Changzamtok area	261
9	Core Area	528
10	Changdeylok	28
11	Changbangdu & Changgeydaphu	132
12	RICBL area	151
	Total	1601

Source: Thimphu Thromde Sewerage Division

Thimphu Thromde plans to have most areas connected to the sewerage system. All areas in Thim Throm will be covered except for periphery E4 areas such as those above Semtokha Dzong and Lubding until the STPs under development at Babesa, Taba and Yangchenphu are commissioned in 2020.

¹¹ Bhutan Living Standards Survey Report 2017

Table 13: Summary of Sewerage System in Thimphu Thromde

SL.No.	Sewage Treatment Plant	Year of establishment	Capacity of STP	Coverage
1	Babesa	Construction started in 1993 and commissioned in 1996	1.75 MLD (Will be decommissioned)	Network covers lower Changzamtog, Tashichhoedzong, Changayney (NPPF colony), below Doebum lam, and Chubachu. Network from Chang- bangdu till Babesa though ADB Project
2	Babesa STP	Ongoing. To be completed in 2021	Upgraded to 12 MLD	Cover the whole of Thimphu excluding area with STPs in LAPs.
3	Dechencholing	Year 2015/16	0.75 MLD	Dechencholing
4	Langjophakha	Year 2017	0.6 MLD	Langjophakha
5	Yangchenphu	Construction completed in 2017 and will be commissioned in 2018/2019	2 MLD	Sewer line/network covers Motithang, Kawajangsa, upper Changangkha, and Yangchenphu area.
6	Taba	Ongoing	1 MLD	Taba
7	Ecoline in Minister's Enclave, Motithang			Ministers Enclave (Managed by NHDC)

4.4.2.1 Scenario 1: Population of 160,000

The total capacity of the sewage treatment plant is 3.20 MLD, taking into account those that are in operation from the year 2017 i.e. Babesa and Dechencholing. After the commissioning of the proposed project by 2020, the total capacity will increase to 16.50 MLD (excluding Minister's enclave eco line). The quantity of storm water being drained into the sewer network is not included in this projection. As per the Thimphu City Development Strategy (2008), the projections assumed that 80 percent of the water per capita consumption goes into wastewater generation i.e. 120 Litre per Capita per Day (lpcd) or 80 percent of 150 lpcd.

With a projected population of 99,655 in 2017 based on a five percent growth rate, the sewerage generated would need a treatment capacity of 11.96 MLD, thus resulting in a deficit of 8.8 MLD. This projected deficit is expected to reduce with the commissioning of the ongoing construction of additional STP and network system. However, with additional increase in population by 2027 and a projected capacity deficit of 2.7 MLD, the STPs would not be adequate to cater to the entire population.

Table 14: Scenario 1 - Projection of Sewerage Generation and Sewerage Design Capacity

Rationale	Year	Population	Sewerage generation	Existing STP Design Capacity (MLD)	Required treatment capacity (MLD)	Surplus/Deficit Treatment Capacity (MLD)	Remarks
Projection for Scenario 1: Population of 160,000	2017	99655	11958600	3.20	11.96	-8.8	Water Consumption = 150 lpcd
	2020	115000	13800000	16.50	13.80	2.7	Sewerage generation = 80% of Water Consumption i.e. 80% of 150 = 120 lpcd
	2027	160000	19200000	16.50	19.20	-2.7	

4.4.2.2 Recommendations

- 1) **Augmentation of existing STP capacity:** To be able to cater to the needs of the increasing population, the capacity of the exiting STPs will need to be augmented. It is also necessary to reserve some area in the decommissioned STPs in Babesa to accommodate for the construction of a new STP in the future.
- 2) **Sewerage Master Plan:** There is an urgent need to develop a long-term master plan to meet the growing needs of the increasing population and to effectively provide holistic and sustainable sewerage treatment infrastructure in Thimphu Throm. The absence of a master plan has hampered the effective planning and management of sewerage infrastructures. As mentioned earlier, the results of the river water quality tests show high presence of E. coli forms in the river water because of overflow from septic tanks.
- 3) **Advocacy and awareness:** Advocacy and awareness, on sanitation related to sewerage management, needs to be conducted. The general public must be made aware that storm and grey water should not be drained into the sewer network, as this would lead to overflow of manholes and diminish the treatment capacity of the STPs.
- 4) **Promote innovative treatment/technology for sewerage:** Alternative technologies for on-site wastewater treatment, with provisions for biogas extraction for local communities, should be explored and promoted.

4.4.2.3 Scenario 2: Population of 200,000

With the projected population in 2027 in Scenario 2, there will be a deficit in the STP capacity by 7.5 MLD. This would require the construction of additional treatment plants in Thimphu Thromde to cater to the additional population of 62,500.

Table 15: Scenario 2 - Projection of Sewerage Generation and Sewerage Design Capacity

Rationale	Year	Population	Sewerage generation	Existing STP Design Capacity (MLD)	Required treatment capacity (MLD)	Surplus/Deficit Treatment capacity (MLD)	Remarks
Projection for Scenario 2: Population of 200,000	2017	115000	13800000	3.20	13.80	-10.6	Water Consumption = 150 lpcd
	2020	142763	17131560	16.50	17.13	-0.6	Sewerage generation = 80% of Water Consumption i.e. 80% of 150 = 120 lpcd
	2027	200000	24000000	16.50	24.00	-7.5	

4.4.2.4 Recommendation

In addition to the recommendations provided for Scenario 1, it is also recommended under Scenario 2 that:

- 1) A centralised sewerage treatment system for high-density areas be set up; and
- 2) On-site sewerage treatment systems be set up for less dense areas and where centralised system is not feasible.

4.4.3 Storm water drainage

4.4.3.1 Current baseline

In the TSP 2002-2027, all the natural waterways are clearly identified. There was no significant problem with regard to the natural drainage system given Thimphu's steep terrain, with water flowing along slopes and draining into the Wang Chhu. The major streams that drain into the Wang Chhu as of 2017, are shown in [Map 14](#).

Over time, however, the construction of residential houses and Thromde infrastructure have caused diversions to the natural watercourse. Such development has resulted in concretisation of Thimphu Throm, which has been facing problems of surface run off.

A major problem is that the design of the existing drainage system is not able to cater to the discharge from the increasing population. The high-density population has been created with change in policy decisions that allowed the number of floors and ground coverage to be increased. In addition to the increased discharge from the population, high intensity rain attributable to climate change also puts extra pressure on the existing drainage infrastructure.

The main issue with storm water is the drainage infrastructure. In some areas, it is non-existent. In areas where there is drainage network, the quality of the drains are an issue due to poor quality workmanship; poor planning with no outlet; and clogging caused by garbage and other wastes resulting in storm water running on the road and causing partial flooding. Drains constructed on an ad hoc basis are generally not smooth and conducive for surface run-off; some alignments also have discontinues drains along the road, leading to overflow and deterioration of road conditions.

The drainage systems are also used for grey water discharge from residences and in some cases overflows from septic tanks are discharged into drainage. Dumping solid wastes into drains also causes stagnation and blockage. Since most of the drainage system passes through the core area where the drains are open channels, pungent odours are emitted. In addition, households not provided with Thromde water supply have placed their water pipes along the drainage networks, which is not safe as it could lead to water contamination and pose health risks.

1.1.1.2 Recommendation

The following recommendations are proposed to address storm water issues:

- 1) **Storm Water Master Plan:** The Thimphu Thromde and the Flood and Engineering and Management Division under MoWHS are currently in the process of preparing the Storm Water Master Plan. Most storm water drainage follows the alignment of natural watercourses. It is recommended that the natural watercourses not be disturbed and channelised for draining storm water, but should be protected and restored to its natural course.
- 2) **Urban infrastructure construction and development guidelines:** Major infrastructures in Thimphu are having issues related to quality and workmanship.

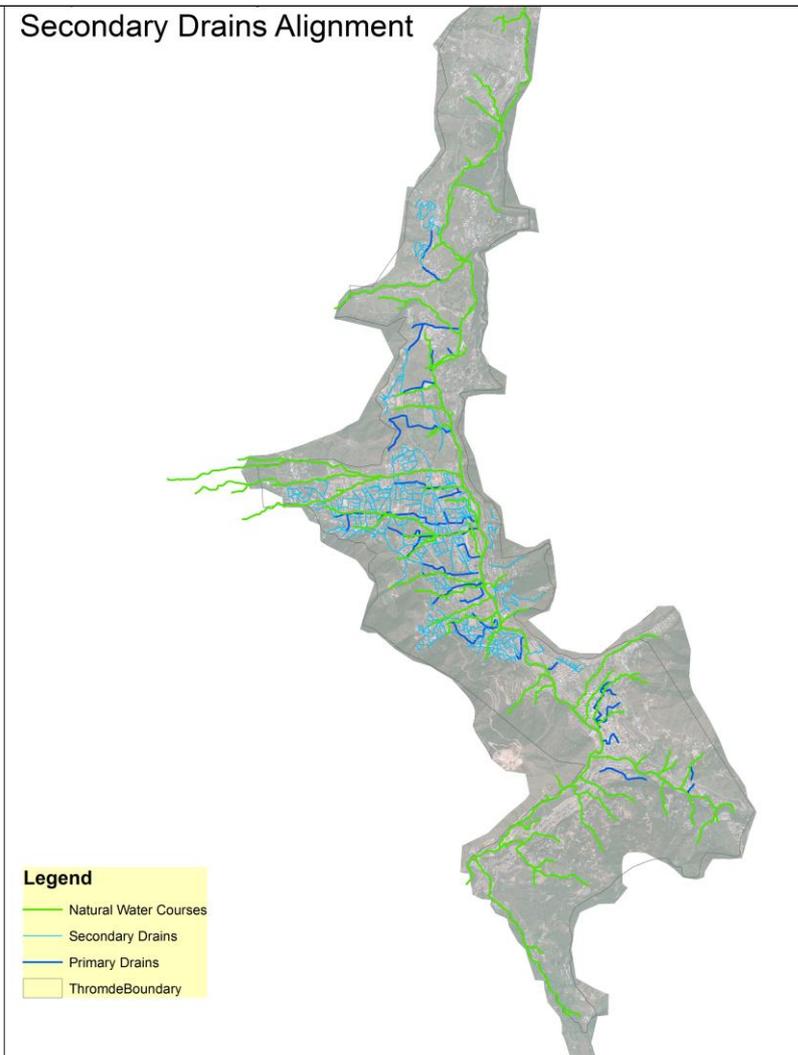
There is need for a guideline and adequate human resource capacity to monitor and inspect the quality and processes of constructions.

- 3) **Public advocacy:** The most visible problem is the dumping of wastes into drains and open areas despite consistent monitoring. Creating awareness and advocating behavioural change among the general public is extremely important, along with enforcing existing rules and regulations.
- 4) **Innovative treatment technology:** It is recommended that innovative forms of treatment technology be used to treat the storm water at the end of the drainage system prior to being drained into Wang Chhu. Through concerted efforts, there is a need to protect the quality of the Wang Chhu at all times.

Map 14 below shows the natural courses, existing primary and secondary drains which are slightly diverted from natural course through development activities.

MAP 14:
Proposed Storm Water Map – Excerpt from the Storm Water Master Plan

Secondary Drains Alignment



4.4.4 Solid Waste

4.4.4.1 Current Baseline

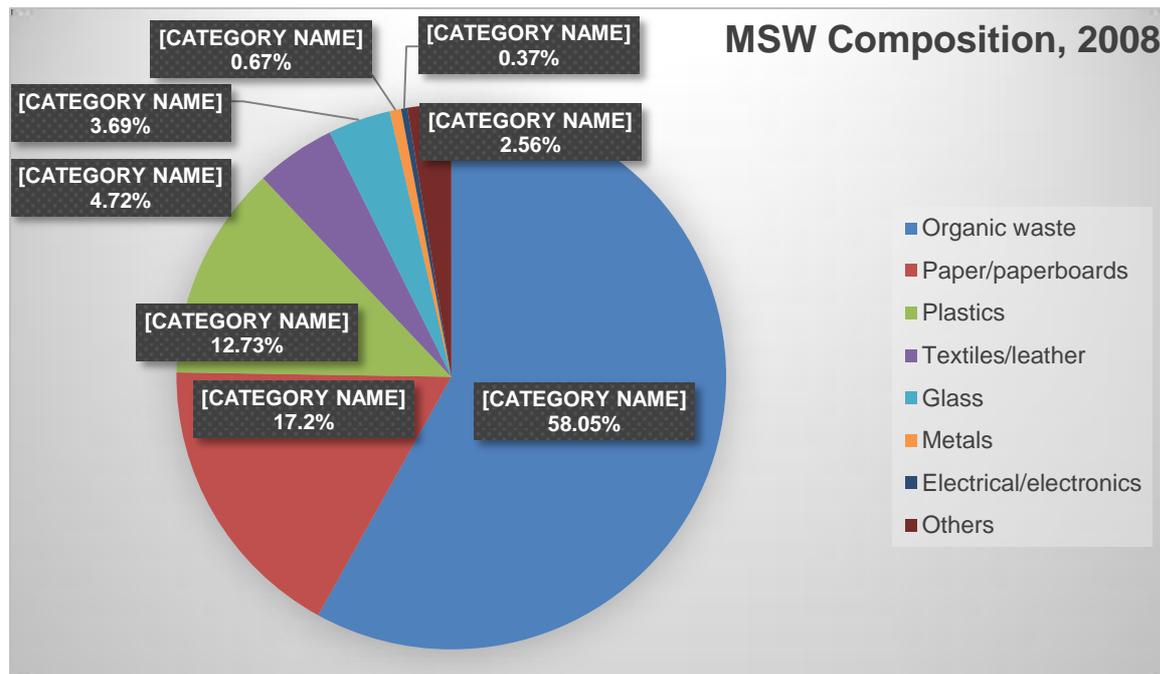
With increasing consumerism and access to a variety of products in Bhutan, the type and amount of wastes being generated is increasing. Wastes range from biodegradable, non-biodegradable, hazardous wastes, and medical wastes to e-waste. Poor management of solid waste is a conspicuous environmental problem mostly attributed to insufficient infrastructure, facilities and services.

Although efforts are being made and there have been some positive impacts, it is difficult for Thimphu Thromde to efficiently deliver Municipal Solid Waste Management (MSWM) infrastructure and services. It is overwhelmed by a number of issues that require urgent attention as listed below:

- MSWM infrastructure is capital intensive and in its absence any effort to improve waste management is an uphill task. In this respect, the Thromde is confronted with inadequate management, lack of technology/infrastructure and human resources, shortage of waste transportation vehicles, and insufficient funding.
- In general, solid waste in the country is not sorted at source and casual littering is a big problem. Burning and open dumping are no longer viable waste management strategies. The landfill in Memelhakha is, in effect, an open waste disposal facility which is poorly operated and poses health risks to local populations with ground and surface water contamination from untreated leachate.
- There is a dearth of data on solid waste management in Thimphu Thromde, which adds to the challenge of providing the appropriate waste management facilities and services.
- While the management of solid wastes should be a collective concern, there is increased generation and dumping given a general lack of civic sense coupled with weak enforcement of rules and regulations.

A national solid waste survey conducted by the MoWHS in 2008 found that the average household waste generation in Thimphu Thromde at the time was 50 metric tons per day, with per capita household waste generation being 0.62 kg per day. Average non-household waste generation rates were 2.362 kg per day per commercial establishment, and 1.439 kg per day per office or 0.329 kg per employee per day. Household waste formed the major portion (40.3%) of the Municipal Solid Waste (MSW) followed by commercial sources at 34.7% of the sources surveyed.

Figure 1: Municipal Solid Waste Composition in Thimphu Thromde in 2008



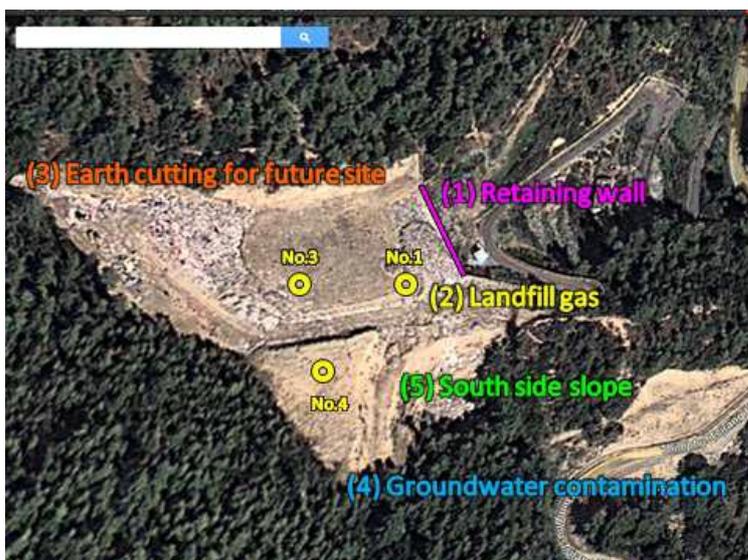
The high organic content of urban MSW, as illustrated in [Figure 1](#), indicates an opportunity to prioritise recycling of organic wastes through composting. Organic waste and hazardous materials are considered among the root causes of environmental problems at the landfill, as they emit greenhouse gas and contaminate ground and surface water through uncontrolled leachate.¹² At one point, the *Thromde* had a compost processing facility in Serbithang which diverted organic waste going to the landfill, but it was closed down amidst issues raised by the community. A new compost plant is under installation in Memelhakha.

Landfill is currently the preferred option for waste management as this is still, in the short term, the cheapest and easiest method of getting rid of waste away from the *Throm*, thus demonstrating a general attitude of “out of sight out of mind”. However, waste management at the disposal sites does not follow international best practices and pose high risks to human as well as ecosystem health.

While the landfill site in Memelhakha was constructed in 1994 with a design period of eight years, it is now in its 23rd year of operation. In fact, the current setup does not qualify as a landfill but is an open dumpsite that is overflowing. Currently, the area is being extended by cutting the hills around it.¹³

¹²Results of the first national solid waste survey in the urban areas of Bhutan 2008.

¹³ With assistance from Government of Japan, management of existing facilities is being conducted to increase the landfill capacity. A semi-aerobic landfill is being constructed wherein extension of existing landfill and renovation of existing infrastructures has been initiated like construction of new approach road; soil embankment; retaining wall; bottom leachate collection facility (main line and branch line); leachate collection pit (capacity 150 m³); gabion for leachate collection; and installation of gas vent. The wastes are being transferred to the project’s semi aerobic landfill located at the lower end of Memelhakha. The transferred wastes are then rolled, spread and covered with soil which is further leveled and compacted to create more space for wastes.



Picture 4: Landfill in Memelhakha

In the meantime, besides the challenge of identifying another landfill site, Thimphu Thromde continues to face an uphill task in managing the enormous waste generated in Thimphu. Some of the steps taken by the Thromde to improve service delivery include outsourcing the collection of MSW to the private sector, as well as the construction and management of a transfer station in Babesa to handle waste segregation.

Automobile wastes: Of a total 93,305 registered vehicles in the country, Thimphu region has the highest number of vehicles at 48,406, according to statistics maintained by the Road Surface and Transport Authority (RSTA).¹⁴ The rapid increase in vehicles has spurred the growth of the automobile service sector, which in turn has brought about a rise in untreated waste contaminating the Olorong Chhu.

A survey conducted by NEC on 20th April, 2012 recorded 20 semi-automated vehicle wash facilities in the Olorong Chhu automobile workshop area. Several car wash facilities have also come up in other areas along the Babesa expressway and in Hejo, Taba and Jungshena. All of these are integrated with existing automobile workshops. While most of these facilities have no effective effluent treatment plant (ETP), all the car wash units claim that their wastewater is channelled into an ETP, a small plant, which is non-functional at Olorong Chhu automobile workshop. At present, water used for washing vehicles is not recycled.

Most of the vehicles are washed unlawfully either at home or in rivers and streams which are then ultimately drained into the Wang Chhu. The contamination of water by untreated car wash effluents is a serious environmental concern, as the wastewater may include high levels of grease and silt, and unacceptable levels of acidity and alkalinity.

E-waste: E-waste is an emerging issue, posing threat to public health and environment, as toxic materials used to make electronics and their components are discarded every day in the country. With its non-biodegradable characteristics, the hazardous e-waste can have environmental impacts and health impacts (issues with digestive, neurological, respiratory and bone tissues, as well as poisoning).

¹⁴ As of 28th February 2018.

A research conducted by the National Institute of Information Technology (NIIT), India, in 2009 estimated that by 2014, there would be about 1,105 to 1,810 metric tonnes of e-waste in Bhutan. An extrapolation of these figures by the Department of Information Technology and Telecom (DITT) suggests that Bhutan could have generated around 2,400 metric tonnes of e-waste in 2016.

Currently, e-waste generated by the government is dumped at the warehouse of the Department of National Properties (DNP) located in Chamzamtog. This e-waste includes desktop and laptop computers and their associated devices like keyboards, printers, scanners, and interruptible power supply units, among others. Shortage of manpower for e-waste regulation enforcement, the lack of expertise and knowledge on e-waste management, and the lack of adequate budget to implement the e-waste regulation are hindering the DNP's management of e-waste.

Medical Waste: Despite significant progress, proper management of medical waste still remains a challenge in health facilities across the country. Issues include lack of resources, expertise, dedicated focal persons for waste, and poor segregation of waste at source. According to the World Health Organisation (WHO), poor management of healthcare waste exposes healthcare workers, waste handlers, patients, and the community to infection and toxic health effects besides polluting the environment. It is essential that all medical waste materials are segregated at the point of generation, appropriately treated and safely disposed.

Infectious waste produced in health facilities include blood-soaked bandages, discarded surgical gloves, cultures, stocks, and swabs that are highly infectious. Pathological waste includes body parts, placenta or foetus, and are said to contain pathogens that can give rise to diseases. Hazardous waste is a non-infectious waste that can harm humans and include needles, syringes, and surgical instruments. Radioactive waste is produced from nuclear medicine treatments and cancer therapy medical equipment that use radioactive isotope.

A study¹⁵ on Medical Waste Management at JDWNRH in 2015 found that on average it produced a little more than 350 kilograms of medical waste daily. Besides the burial pit that is expected to last for 10 to 15 years, the hospital is also equipped with an autoclave machine and shredder to dispose of the medical wastes.

¹⁵ (Num Num Choden, 2015).

4.4.4.2 Scenario 1: Population of 160,000

Table 16: Scenario 1 - Projection of Municipal Solid Waste Generation

Rationale	Year	Population	Solid waste generation (Metric Tons/Day)	Landfill capacity	Remarks
Projection for Scenario 1: Population of 160,000	2008	79869	50	Exceeded	0.62kgpcd (Per capita generation)
	2013	81986	50.8	Exceeded	
	2017	99655	61.8	Exceeded	
	2020	115000	71.3	Exceeded	
	2027	160000	99.2	Exceeded	

Looking ahead to 2027, Thimphu Thromde's solid waste generation is estimated to be 99.2 metric tons per day. The Memelhakha landfill continues to be used although it is overflowing and well beyond capacity. While measures are being taken to extend its capacity, it is not possible to do so to cater to a projected population of 160,000 in 2027. There is therefore a need to identify a new site for a sanitary landfill, and to also work on making the Memelhakha site safe and secure.

4.4.4.3 Recommendations

- 1) **Reduce, Reuse and Recycle:** Following the fundamentals of sustainable waste management, it will be necessary to reduce the quantity and noxiousness of waste at source; introduce separate collection and sorting procedures to encourage recycling and reuse; organise waste transportation; and invest in recycling, energy and organic recovery technologies.
- 2) **Segregation at source** should be encouraged and implemented followed by separate collection and sorting procedures to encourage recycling and reuse. Accordingly, segregated waste transportation, treatment and disposal should be systematically organised.
- 3) **Composting:** There is a need to promote innovative ideas on individual, household and community composting. In addition to reducing the amount of waste headed to landfills, this would also help address issues of vehicular emission by reducing the need for transporting wastes to disposal sites. It would further contribute to Bhutan's efforts at becoming 100 percent organic.
- 4) **Efficient municipal solid waste management infrastructure and services:** While developing an adequate MSWM system is capital intensive and challenging, it is extremely important and must be done. In addition, the existing infrastructure and services for SWM in Thimphu Thromde requires strengthening.
- 5) **Securing and rehabilitating the Memelhakha landfill:** The landfill needs to be made safe and secure. Cost-effective measures must be taken to expand the capacity of the landfill with efficient leachate collection system and gas vent. There is also a

need to rehabilitate and promote the extraction of the reusable waste which are already dumped in the landfill, to turn the waste into resource for revenue generation.

- 6) **Efficient treatment of automobile wastes:** Innovative technology that is efficient in treating effluents and wastes from the automobile service sector must be explored and utilised.
- 7) **SWM policies, plans, rules and regulations must be strictly enforced.**
- 8) **Raising awareness:** Awareness on solid waste management must be raised, including on individual and community civic responsibility to keep private residential as well as public areas clean. Reducing unnecessary consumption and promoting of sustainable consumption practices must be advocated.
- 9) **Tariff structure/Collection Fee:** The current SWM system is heavily subsidised by the government and is not sustainable in the long run. A low percentage of clients pay for waste services as there is a high percentage of unserved households. As a result, waste management is a major liability for the Thromde. In consultation with all stakeholders, a solid waste management service fee should be introduced.
- 10) **Public private partnership and community partnership:** Although the Thromde is exploring various possibilities of waste management in the form of outsourcing some of the related activities, innovative forms of public-private partnership (PPP) and community partnerships could also be explored.

4.4.4.4 Scenario 2: Population of 200,000

With a projected population of 200,000 by 2027 in Scenario 2, solid waste generation is estimated to be 124 metric tons of waste per day. The existing disposal site at Memelhakha will not be able to accommodate this amount of waste, and additional infrastructure and services will be required to cater to the increased population.

Table 6: Scenario 2 - Projection of Solid Waste Generation

Rationale	Year	Population	Solid waste generation (Metric Tons/Day)	Landfill capacity	Remarks
Projection for Scenario 2: Population of 200,000	2017	115000	71.3	Exceeded	0.62kgpcd (Per capita generation)
	2020	142763	88.5	Exceeded	
	2027	200000	124.0	Exceeded	

4.4.4.5 Recommendations

- 1) **Sanitary Landfill:** As mentioned earlier, a new sanitary landfill site needs to be identified, but it must be clear that doing so is not the solution to addressing the issues related to solid waste. Identifying new landfill sites could encourage more

waste generation, which is not desirable, but keeping in view the increased population under Scenario 2 the corresponding increase in waste generation will have to be disposed. At the same time, Integrated Municipal Waste Management Practice must be strictly implemented so as to reduce the residual wastes disposed at the sanitary landfill after undergoing segregation and treatment. During its operational phase, sanitary landfill management practices must be implemented as otherwise it will adversely affect the surrounding environment.

- 2) Transfer Station:** The transfer station is a key component of cost-effective solid waste transportation. It is proposed that transfer station be located in two areas, perhaps North and Central Thimphu.

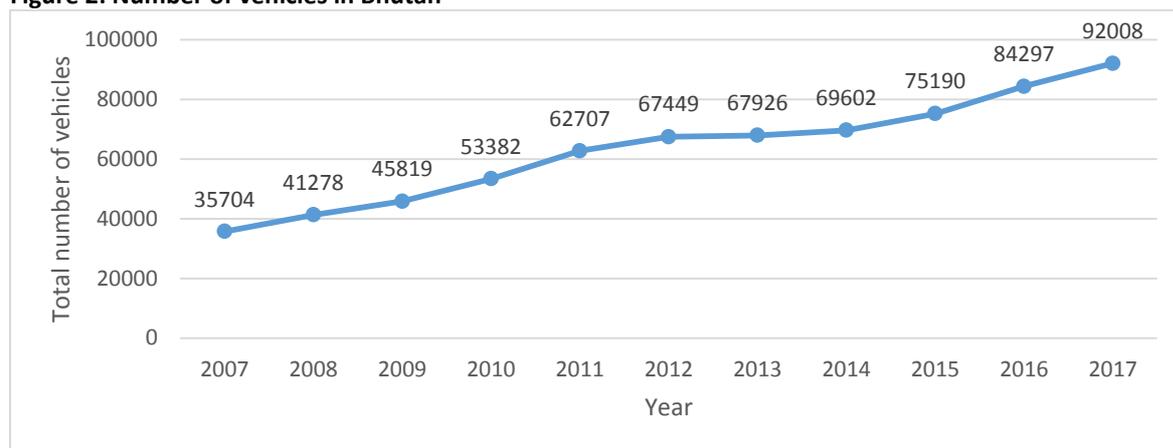
In addition to these, all the recommendations provided under Scenario 1 should also be initiated and implemented.

4.4.5 Transport and Mobility

4.4.5.1 Current baseline

The number of vehicles in the country is increasing rapidly, with a 158 percent increase recorded over the last one decade. This has implications on the environment, economy and social wellbeing of the people. As of December 2017, the total number of vehicles was 92,008 while in 2007 it was 35,704, as shown in [Figure 2](#). In terms of distribution, 51.9 percent of all vehicles are registered under Thimphu Region which includes the six *dzongkhags* of Thimphu, Paro, Haa, Wangdue, Punakha and Gasa.

Figure 2: Number of vehicles in Bhutan



Source: Annual Info-Comm & Transport Bulletin 2018

Emissions of air pollutants and greenhouse gases are among the most pressing environmental challenges faced by Bhutan. Air pollution (both particulate & gaseous) in excess of their prescribed limits causes harmful effects such as respiratory disorders, lung cancer, nose and eye irritation. Most affected by bad air quality are children, elderly and the less affluent sections society.

Local air pollutants are Particulate Matter (PM), SO_x and NO_x (NO, NO₂), and Carbon monoxide (CO), which are emitted due to combustion of hydrocarbon fuels like coal, oil and natural gas. These pollutants are emitted from mobile sources (vehicles, airplanes, motorcycles); stationary sources (industries, power plants, households); and others (construction activities, dusts, burning of biomass).

Table 18: National and WHO Guideline Air Quality Standards in $\mu\text{g}/\text{m}^3$

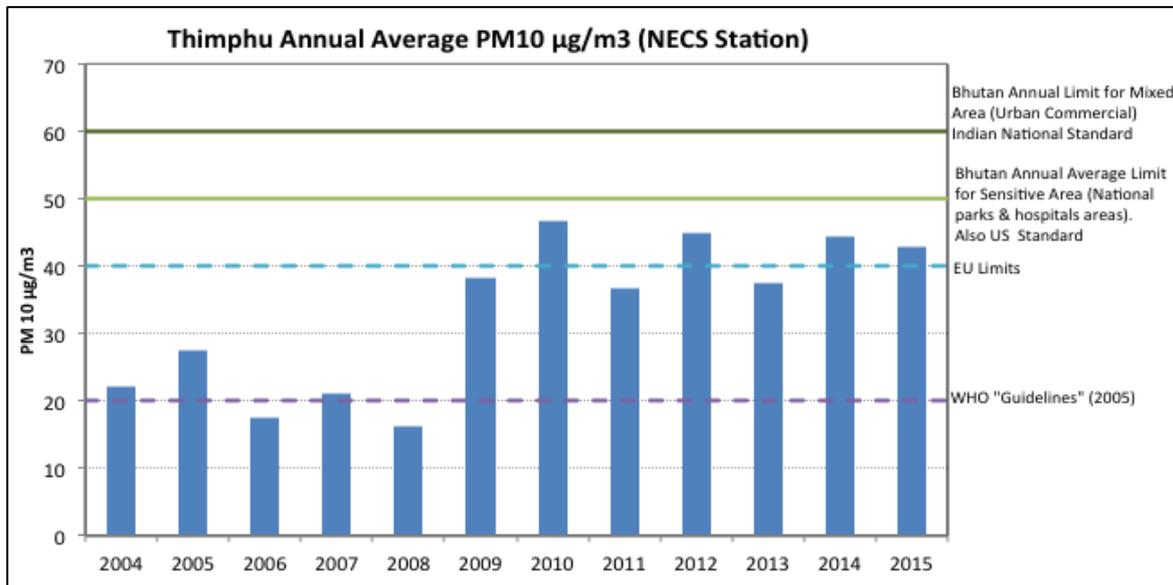
Parameter	National Standard ¹⁶		WHO Guideline	
	24-hour	Annual mean	24-hour	Annual mean
PM ₁₀	100	60	50	20
NO ₂	80	60	200 (1 hour)	40
SO ₂	80	60	20	n.a.
CO	4,000 (1 hour)	n.a.	3,000 (1 hour)	n.a.
	2,000 (8 hour)		1,000 (8 hour)	

Source: WHO, 2006 and 2000; NEC 2013a

¹⁶ For mixed areas i.e. residential, commercial or both activities: standards for sensitive areas (schools, hospitals sensitive ecosystems are more stringent)

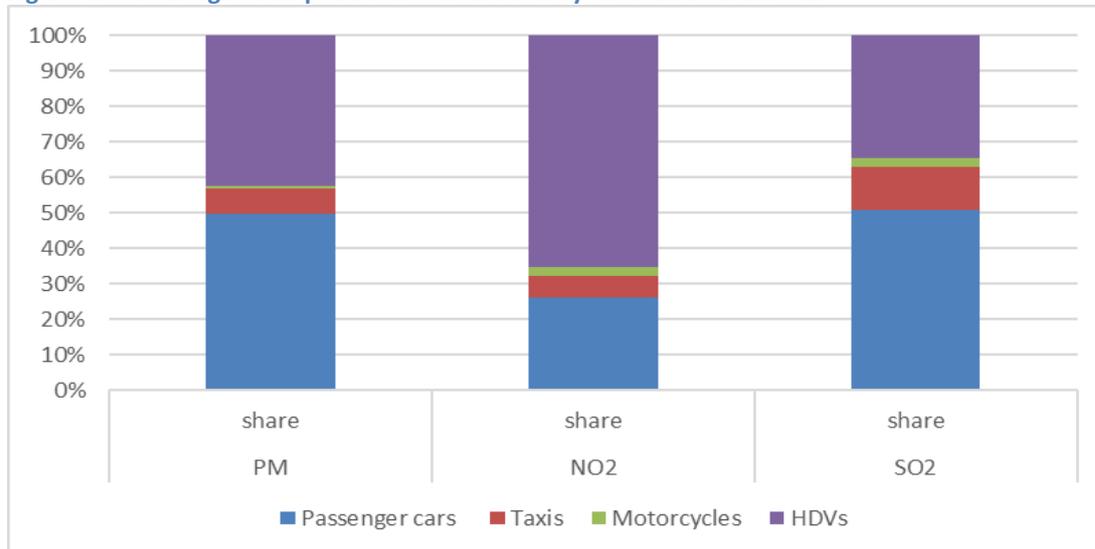
Thimphu’s annual average PM₁₀ measurements show increasing levels. Monitored levels are below the national standard but above the WHO guideline, as shown in [Figure 3](#). In Thimphu, vehicular emissions are the major source of these pollutants.

Figure 3: Thimphu Annual Average PM₁₀ Levels



In urban areas where air pollution is the most critical, the major source of air pollutants is passenger cars together with Heavy Duty Vehicles (HDVs) i.e. large trucks and buses. [Figure 4](#) shows the percentage of air pollution contribution by vehicles in Bhutan, according to an assessment conducted by NEC in December 2017.

Figure 4: Percentage of air pollution contribution by the vehicle in Bhutan



Acting prior to having an extreme situation also proves to be a more cost-effective strategy than trying to clean up a city’s air once unsustainable levels are reached. Measures in the vehicle sector will only be felt in the long-term and require early action due to the low vehicle replacement rate. If vehicles are used, for example, for 15 years or more the vehicle replacement figure is only around six percent annually, and regulations concerning vehicle

emission standards for new vehicles will only have a decisive impact on the vehicle stock and the corresponding air quality after about a decade.

Apart from environmental impacts, there is huge economic and social cost. The increasing vehicle population is directly proportional to increase in petroleum import. In 2016, vehicle imports resulted in an outflow of Indian Rupee (INR) 6.94 billion, contributing to the depletion of INR reserve. Bhutan trade statistics show that Nu. 547 million worth of vehicles were imported in 2013, which shot up to more than Nu. two billion in 2014. The import of vehicles and fuel together contribute to a major chunk of trade deficit.

Thimphu transport services: Transport services in Thimphu Throm are provided by public buses, private buses and through para transit modes or taxis. ‘City Bus Service’ (CBS) is an arm of Bhutan Postal Corporation, a state-owned enterprise, and a fleet of 54 buses currently service Thimphu. In addition to the CBS bus routes, RSTA has authorised two private companies to operate buses from Thimphu Throm centre to developed areas that lie outside the Thromde boundaries. To the north, beyond Dechenchholing, these buses serve Kabesa; and to the south of the city, they serve areas beyond Babesa.

Table 19 shows the number of vehicles registered in Thimphu Region as of December 2016.

Table 19: Number of vehicles registered in Thimphu Region

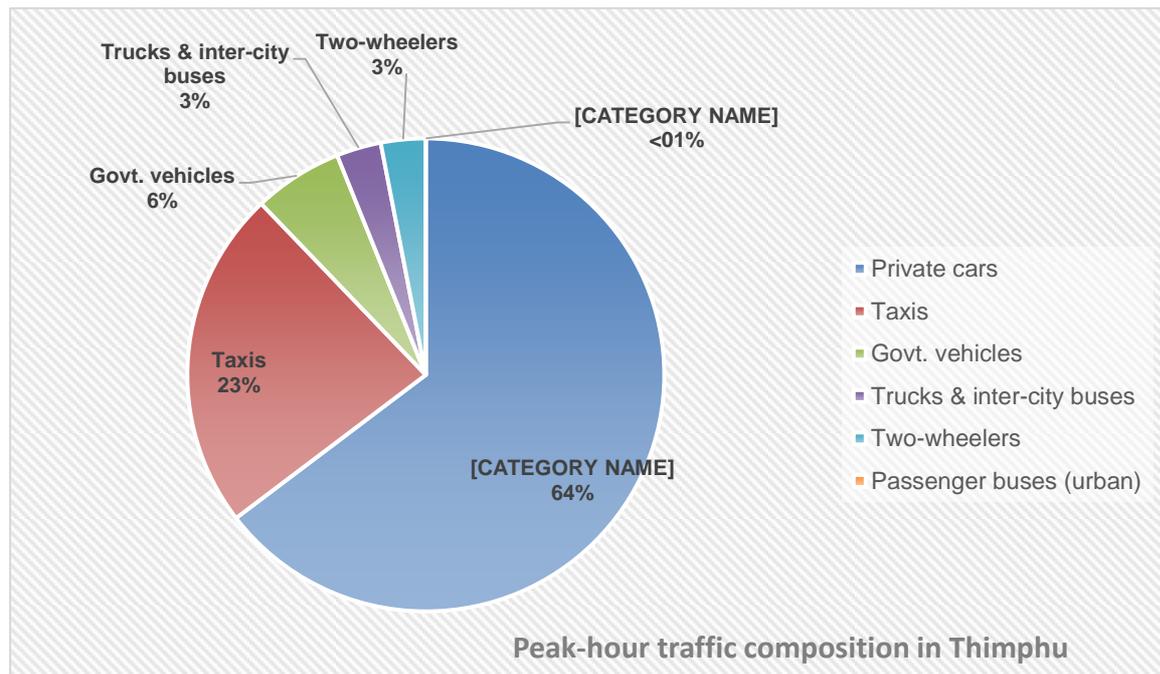
Vehicle Type	2016 (end December)
Public Transport (buses)	54
Private cars including Electric Vehicle	32,005
Two-wheelers	3,117
Taxis	2,832
Other	5,644
Total	43,652

Taxis have grown rapidly over the years. The number of taxis per 10,000 population in Thimphu is more than 240, which is six times higher than the optimal level. Car registrations increased by 11 percent between 2015 and 2016, which means an additional 300 cars were added each month in 2016. Such growth in private car ownership has begun to create traffic congestion, as indicated in Table 20, and has already created excessive amount of on-street parking, while also worsening the air quality. Figure 5 illustrates Thimphu City’s peak-hour traffic composition.

Table 20: Congestion Level - Volume to Capacity Ratio

Road Name	Capacity (cars/hr)	Volume to Capacity Ratio (Congestion Level)
Expressway	3,600	0.72
Old Highway	750	0.20
Deybum Lam	3,600	0.49
Norzin Lam	1,200	0.71
Chang Lam	3,600	0.52
Chhogyal lam	750	0.95
Desi Lam	1,500	0.57
Thori Lam	1,500	0.47
Dechen Lam	750	0.98

Figure 5: Thimphu City's peak-hour traffic composition



In most cities around the world, the main alternative to private car is public transport. Currently in Thimphu, the bus services are still at its infancy stage with insufficient capacity in the peak hours, very poor or non-existent service in the off-peak hours and no service after 6:30pm. This has to change, and to increase the general public's use of public transportation, it is critical to improve the bus services while actively discouraging the use of private cars. While these issues were foreseen in the TSP and accordingly objectives were clearly set out, only a few of the proposed measures have been implemented.

4.4.5.2 Projection for Scenario 1: Population of 160,000

Table 21: Scenario 1 - Projection of Vehicle Number

Rationale	Year	Population	No. of Vehicles	Ratio (Population to Vehicle) as per MLCP
Projection for Scenario 1: Population of 160,000	2013	81986	36075	2.273
	2017	99655	43843	2.273
	2020	115000	50594	2.273
	2027	160000	70391	2.273
MLCP – Multi Level Car Park Report, 2014				

With a projected population of 160,000 and an estimated 70,391 vehicles, the main streets of Thimphu i.e. Norzin Lam and Chang Lam will face extreme congestion during peak hours. This may cause many sections of the network to become more overloaded and congested. The vehicle ratio (population to vehicle) of 2.273 is very high compared to global cities and requires urgent attention.

4.4.5.3 Recommendation

While scenario 1 does not warrant a major capital investment, it will be critical to improve the existing bus services, promote non-motorised transport such as pedestrianisation and cycling, and streamline some institutional arrangements. Specifically, the following are recommended:

- 1) **Improve public transport and mobility:** Develop a Thromde Mobility Plan geared towards improving the bus services and increasing demand for ridership. Among others, the plan must provide for improvements to routes, frequencies, terminal arrangements for every route, bus stops and shelter that are integrated with pavements, footpath network and cycle path. Ascertained through the mobility plan, additional fleet of buses needed to be injected for improved public transportation.
- 2) **Preferences for public transport:** While an efficient public transport is perceived to be an effective solution, the situation is no different if the city buses are trapped in the congestion and there is no special lane. Hence, to ensure reliability of the bus services, dedicated bus lanes and alternate traffic arrangement must be provided.
- 3) **Lead agency:** There is arguably a need for one agency to take responsibility for public transport and mobility within Thimphu Throm and to come up with greatly improved services for the public. In most countries around the world this lead is taken by the city authorities since the city is best placed to understand its needs. Hence it is proposed that Thromde take up this responsibility. A dedicated transport and mobility division/unit must be established with the mandate of improving the bus services. It must focus on transport and mobility planning, setting standards, developing Standard Operating Procedure (SOPs) and ensure strict compliance of the service level by the bus operators.

The dedicated transport and mobility office of the Thromde must be equipped with professionally qualified staff that will enable effective transport mobility planning, monitoring, traffic management, sidewalk maintenance and landscaping, etc.

- 4) **Financing:** Until a sustainable arrangement for providing bus services is arrived at, Government will have to continue providing the required subsidy. Otherwise it will not be possible to improve public transport and mobility, increase bus ridership and address traffic congestion and deteriorating air quality.

With efficient bus services put in place, Thromde with approval of the Ministry of Finance could introduce congestion fees especially on some of the core areas. The fees collected could be used for improving the bus services in the City.

- 5) **Monetary and fiscal measures:** The improved and reliable transport and mobility services must be commensurate with stringent measures to control vehicle population for the economic and environmental health of the country. This calls for both monetary and fiscal measures to contain import of cars. As of April 2017, the financial institutions in the country have provided transport loan of more than Nu.

4.8 billion, out of the total Nu. 94 billion loan granted in the domestic market. The Central Bank therefore, has taken a good move in August 2017 to lower the vehicle loan from 50 percent to 30 percent. Such monetary measures must correspond with some fiscal measures. Otherwise, people avail other loan products and use it to purchase vehicles.

- 6) **Electric vehicle and infrastructure:** Promote electric vehicles and provide the necessary infrastructure facilities such as parking spaces and fast charging stations, located in different parts of Thimphu Throm and gradually along the highways.
- 7) **Neighbourhood nodes:** Implement the NNs as provided in the TSP, starting with, at least one each in the north and south of Thimphu. Currently none of the NNs has been implemented. This is largely because of non-availability of resources and limited coordination among agencies. It requires many agencies to come together and hence an implementation plan with clear delineation of responsibilities is critical. With the implementation of NN, frequency of the trips made to the urban core will be reduced, as essential facilities and services are contained within the location.
- 8) **Parking management:** Adequate parking space must be made mandatory for all residents/users of buildings and ensure strict compliance with the DCR. Thromde must strategise further to use parking management as a tool for transport demand management, discouraging the use of private vehicles and encouraging the use of public transport and non-motorised modes. One factor contributing to traffic congestion is the taxis looking for passengers to fill their taxis, especially at the Chang Lam Bus Terminal. Hence, Thromde could explore providing a taxi parking in each of the LAPs.
- 9) **Promote Pedestrianisation:** Thromde must assess the condition of all footpaths in the Throm and accordingly make improvements. The assessment must also include conditions of high risk areas such as schools, hospitals, high speed traffic flows, etc. and identify locations requiring attention. As envisioned in the TSP, Norzin Lam (between the fuel station and traffic intersection with Chorten Lam) should be pedestrianised.
- 10) **Cycle Paths:** Cycling is an important mode of non-motorised transport and must be promoted for commuting and for leisure trips. Thromde must continue to create the environment and construct more cycle paths. Storage facilities for parking of bicycles would also have to be considered as part of the overall mobility plan.
- 11) **ICT Park and ride:** Enable the adoption of appropriate technologies to improve efficiency of transport services. This may include, for example, Intelligent Transport Systems for efficient surveillance and maintenance of a relatively smooth traffic flow, including the use of modern methods for parking control and parking revenue collections.

4.4.5.4 Projection for Scenario 2: Population of 200,000

Table 22: Scenario 2 - Projection of Vehicle number

Rationale	Year	Population	No. of Vehicles	Ratio (Population to Vehicle)
Projection for Scenario 2: Population of 200,000	2017	115000	43843	2.273
	2020	142763	62808	2.273
	2027	200000	87989	2.273

With a projected population of 200,000 and an estimated 87,989 vehicles in Scenario 2, the severity of congestion and traffic issues is going to be high. In addition, a comprehensive sustainable transport planning and investment is required, given that the transport sector is one of the major consumers of energy in Bhutan (18.6 percent of total energy consumption) and subsequently one of the main contributors to air pollution (over 45 percent of the total green-house gas emission in Bhutan).

4.4.5.5 Recommendations

Given the significant projected increase in population and vehicle numbers in Scenario 2, it warrants policy interventions as well as major investments to promote eco-friendly and efficient public transport and mobility system.

- 1) **Policy:** A holistic, whole of government approach is required to achieve the transport vision. Policies across Government agencies must be harmonised and acclimatised. For instance, education policy must discourage establishment of private schools and institutions all over the places without consideration for land use, traffic circulation and added pressure on existing infrastructures and services. The enrolment of students must be residence-based i.e. except in a few non-avoidable circumstances, children residing in North Thimphu must be encouraged to study in North Thimphu, and likewise for other areas.

As the location of offices influence congregation and congestion, it may be necessary to explore the shifting of some institutions from the core town area, while ensuring that any establishment of new office structures are strictly in compliance with land use provisions and traffic circulation.

- 2) **Promote efficient and eco-friendly public transport and mobility:** A detailed study to assess the urban transport situation in Thimphu was carried out by the International Finance Corporation (IFC) in 2011/2012. Accordingly, recommendation was made for Bus Rapid Transit (BRT) system as the most preferred and feasible mass transit option along the spine of the main urban corridor (between Dechenchholing to Babesa).

The recommendation was to start with low emission diesel buses and gradually switch-over to the hybrid electric mode with improvement in ridership. PPP model is

proposed with a concession period of 20 years during which time the Government will be required to provide subsidy to the operator to bridge the viability gap. For a population of 200,000, the proposed establishment of a robust transport and mobility system such as the BRT system is highly recommended along with construction of two bus terminals, one in south (Babesa) and one in north (Dechencholing). However, while planning, cautious measures must be adopted to integrate with Thromde land use. Funding may be a challenge for which innovative sources of financing might have to be explored.

Table 23 is the detailed description of the proposed BRT system as outlined in the IFC study:

Table 23: Proposed Bus Rapid Transit (BRT) System

Plan Element	Description
Routes	One BRT Trunk Route from Babesa – Dechencholing (17.6 km) operating from 07:00 hrs to 20:00 hrs. This trunk route must have interface at certain intervals by secondary/feeder routes served by smaller buses. Four Secondary Routes; Babesa to Mothithang (17.1 km); Dechencholing to Mothithang (14.1 km) Central Bus Terminal to Dechencholing (8.6 km); Central Bus Terminal to Babesa (11.6km)
Passenger Fares	BRT Route: Twice the existing bus fares Secondary Routes: 1.5 times the existing bus fares
Fare Collection System	On board automatic fare collection system
Fleet	<ul style="list-style-type: none"> - 9 modern diesel buses including one bus as standby are required during Phase 1 operations on BRT route - 11 modern hybrid buses including one bus as standby are required during Phase 2 operations on BRT route - 20 modern diesel buses including two buses as standby are required for Secondary route operations
Fleet Technology Type	60-capacity modern diesel bus (in Phase1)/Hybrid Electric Bus (in Phase 2) for trunk route 40-passengers mini diesel bus for Secondary routes
Headways	Headway of 10 minutes for the BRT route Headway of 20 minutes for each of the Secondary routes
Passenger Daily Ridership (Base Year)	6,100 (rounded) on the BRT route Between 2,400 - 3,300 (rounded) on secondary routes
Estimated vehicle utilisation	214 km per bus per day on the BRT route 209 km per bus per day on Secondary routes
Bus Shelters	BRT Route; 18 bus stops in Phase 1 & 29 bus stops in Phase 2 46 bus stops along secondary routes
Bus Terminals	2-acre Babesa Terminal 2-acre Dechencholing Terminal 2-acre Central Bus Terminal

Map 15: Proposed Public Transport and Mobility System



- 3) **Move to electric vehicles (EV):** Owing to excessive dependence on fossil fuel and the transport sector contributing to about 42 percent of total emissions, it is timely to gradually switch over to battery technology, which is an exciting possibility. Government must plan to have all taxis and passenger transport buses operating in urban areas convert to energy efficient technologies. As such, it will have to provide charging stations and other necessary infrastructure. Given the competing demand for funds from the social services sector, investment could be a challenge, and hence, innovative funding sources must be explored.

To help make EVs attractive and encourage ownership, Government could explore incentives for EV users such as free parking, free (or subsidised) use of charging facility, among others.

4.4.6 Housing

4.4.6.1 Current Baseline

As in any developing country, the issue of affordable and appropriate housing is a serious concern in Bhutan. In recent decades, home prices and rental rates have increased faster than income, giving rise to new social disparities in terms of access to housing and affordability.¹⁷ Access to proper and affordable housing is fundamental to the wellbeing and socioeconomic prosperity of the community and country as a whole.

The Bhutan Living Standard Survey (BLSS) 2017 shows that in Thimphu Dzongkhag, 17 percent of households live in rent-free dwellings while 59 percent pay rent, and the remaining 24 percent own their dwellings. Among rent paying households, 85 percent live in dwellings owned by private individuals, and 14 percent live in housing owed by the government and public corporations.

The key players in the housing sector are the National Housing Development Corporation Limited (NHDCL), National Pension and Provident Fund (NPPF), Ministry of Health (MoH), the armed forces, Ministry of Education (MoE), Bank of Bhutan (BoB), and the MoWHS. NHDCL and NPPF provide housing on rental basis to the civil servants, while the other agencies provide housing for their employees. The private sector is the largest provider of dwellings for rent in urban areas.

With rapid economic development and increasing rural-urban migration, the state of housing and home environment especially for vulnerable groups is a concern. The large proportion of low-income, unemployed and dependent population in urban areas especially in Thimphu has resulted in deteriorated per capita housing space and associated facilities. Shared rental practices and higher number of people per households is leading social problems and undesirable home environment.

The Government initiated the Changjiji Housing project in 2000, for low- to middle-income civil servants, partly also to avoid slums and shanty towns from developing. The Changjiji Housing Colony comprises 73 buildings with 700 apartments for about 3,000 people.

¹⁷ The concept of affordability can be quite subjective; European countries use a threshold of 40 percent of ones' household income towards housing costs to measure affordability, while Australia, India and the United states use a 30 percent threshold.

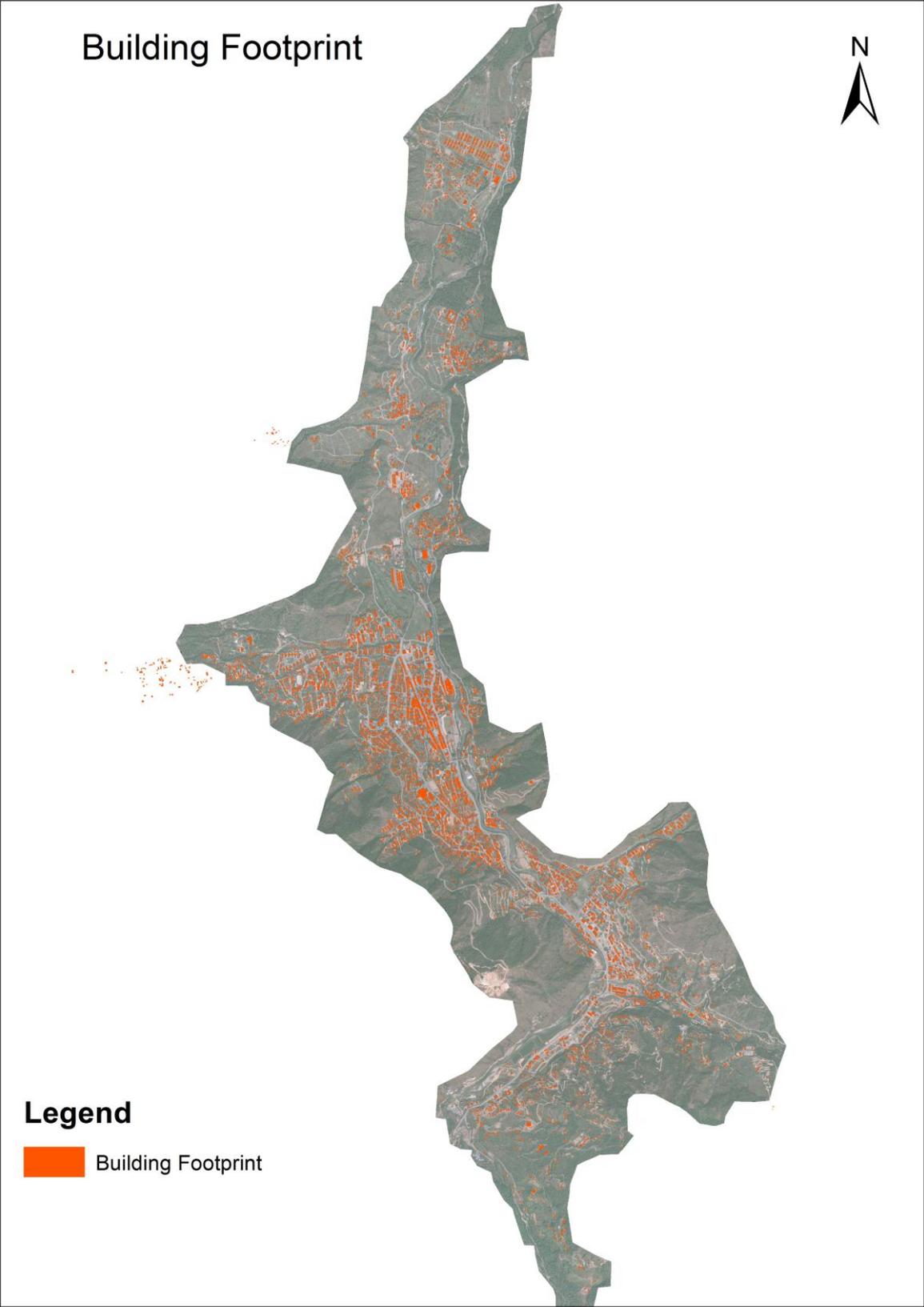
Building Footprint



Legend

 Building Footprint

Map 16: Building footprint in Thimphu



Given the deviation from the TSP in terms of increasing population density in the urban villages, the city now accommodates more than what was initially proposed. Currently the number of households works out to be 24,090 as calculated in [Table 24](#).

Table 24: Calculation of current household based on the current state of development

Sl. No	PARTICULARS	VALUES		REMARKS
1	Total built up area/plinth area in urban core (UC and UV-1 precinct)	154,600	sq.m.	from GIS map
2	Total number of storeys	6		from prevailing practise
3	Number of storey used for residential (only 1 of 5 or 6)	1		from ground observation
4	Total built up area/plinth area in Urban Village (UVs)	563,600	sq.m.	from GIS map
5	Total number of storeys	5		from prevailing practise
6	Number of storey used for residential (only 4 of 5)	4		from ground observation
7	Total built up area (C1*1+C4*4)	2,409,000	sq.m.	sum of Urban Core and Urban Villages
8	Area for one household	100	sq.m.	assumptions
	Total house hold (Existing)	24,090	units	

4.4.6.2 Housing Projection (in both Scenarios)

As there is abundant area for residential usage, development activities in Thimphu are taking place continuously. LAPs like Hejo-Samteling are in the development phase with basic infrastructure and services put in place recently. Taking into account vacant areas that are still available and the areas that can be fully developed in future, the carrying capacity of households in Thimphu including those already existing is computed to be 76,841, as shown in the Table 25:

Table 25: Carrying capacity of households in Thimphu

PROJECTIONS				
Sl. No	PARTICULARS	VALUES		REMARKS
1	Vacant area in Urban Core (UC &UV)	399200	sq.m.	from GIS maps
2	Coverage	50%		Assumption from the prevailing norms
3	Average number of storeys	6		from prevailing practice
4	Number of storey used for residential (only 1)	1		from prevailing practice

5	Total built up area for Urban Core	199,600	sq.m.	
6	Vacant area in Urban Villages (UVs)	3172200	sq.m.	
7	Coverage	40%		Assumption from prevailing norm
8	Average number of storeys	5		from prevailing practise
9	number of storey used for residential	4		Considering ground floor as commercial and remaining 4 floors as residential.
10	Total built up area for Urban Villages	5,075,520	sq.m.	
11	Total built up area	5,275,120	sq.m.	
12	Area for one household	100	sq.m.	assumptions
13	Total number of household	52751.2	units	
14	Carrying capacity of household in TSP (Existing + Projection)	76,841	units	Population of 307364 can be accommodated considering household size of 4

Table 26: SCENARIO 1 (Population of 160000)

Sl. No	PARTICULARS	VALUES		REMARKS
a.	Population	160,000	nos.	
b.	House hold size	4	nos.	
c.	Projected household	40000	nos.	
d.	TSP capacity of household	76841	units	
e.	Surplus	36841	units	

The total number of dwelling units required for Scenario 1 indicates that there will be more than enough housing. With a surplus of 36,841 units, an additional population of 147,364 can be accommodated.

Table 27: SCENARIO 2 (Population of 200000)

Sl. No	PARTICULARS	VALUES		REMARKS
a.	Population	200,000	nos.	
b.	House hold size	4	unit	
c.	Projected household	50000	nos.	
d.	TSP capacity of household	76841	units	
d.	Surplus	26841	nos.	

The total number of dwelling units required for Scenario 2 also indicates that there will be more than enough housing. With a surplus of 26,841 households, an additional population of 107,364 can be accommodated.

4.4.6.3 Recommendations

Based on the aforementioned analysis, the TSP has identified enough area for housing whereby the projected population in both scenarios can be accommodated within the existing Thromde boundary. As such, certain residential areas should only have housing with fewer number of floors. It is therefore necessary to review the recent approval of additional floor in lieu of attic, which has increased density in every precinct and is a deviation from the approved DCR for Thimphu.

Besides the projection for housing availability, it is even more important to focus on housing affordability and accessibility, home ownership, earthquake and fire resilience, and integration of social spaces within housing provisions in accordance with the TSP's principle of community conviviality. The current housing infrastructure provides 24,088 units, of which approximately 1700 units is provided by the NHDCL, NPPF, MoH, MoE and BPC as affordable housing. The rest are provided by the private sector and are unaffordable for most residents. This not only underscores the huge gap between demand and supply of housing, but also represents the disparity in living conditions among Thimphu residents.

The cost of land is high and continues to rise exorbitantly, making it unaffordable for middle- and low-income people to own land. Moreover, the interest rates on housing loans are quite high. Non-commercial housing loans are provided at an interest rate of 8.46 to 11 percent by the Bank of Bhutan (BoB); 10.50 to 11 percent by the Bhutan National Bank (BNB); 11 percent by the NPPF; and 13 percent by the Druk Punjab Bank (DPNB). While the rates are somewhat comparable to those in India, where the State Bank of India (SBI) provides housing loan at an interest rate of 8.55 to nine percent, they are relatively higher than in other countries.

For instance, the Housing Development Board (HDB) in Singapore provides housing loan at around 2.6 percent, and it has achieved 90 percent home ownership; in addition, different lending rates are provided for economically weaker sections of society. In Australia, the Westpac and National Australian Bank (NAB) provide housing loans at 6.7 percent and 5.77 percent respectively.

In addition, the cost of construction in Bhutan is also high due to dependence on imported construction materials and high transportation costs. There is thus a need to further study the issue of affordable housing and come up with appropriate measures to address it. In particular, some of the issues to be considered include:

- **Non-compliance to the Tenancy Act of Bhutan 2015:** As per the Tenancy Act of Bhutan, the house owner shall not increase the rent before two years from the day on which a tenant occupies the house. If the owner does so, the owner will be fined an amount equivalent to two months' rent. However, the 2012 Bhutan Living Standards Survey (BLSS) recorded that the house rent of about 23.3 percent of the households had increased once a year, and that of about 6.6 percent had increased twice a year. This inevitably leads to high housing costs. While there is penalty clause in the Act, the question remains whether the tenant would be in a position to report and fight over the rent increase when there is limited option to move to a new place.

Further, 10 percent increase every two years as per the Tenancy Act of Bhutan would double the house rent in 20 years. Some landlords set a high house rent initially to maximise profit. Therefore, realistic house rent need to be worked out and the Government should explore regulating the rent on carpet area basis as it is done for NHDCL quarters.

- ***Increasing pressure on housing – growth of slums:*** The lack of affordable housing has given rise to the growth of slums in the Throm, thus compromising health and sanitation conditions for the poor and most vulnerable groups. These settlements are also more prone to disasters.
- ***Illegal conversion of residential units to commercial purposes:*** There are reports of building owners converting residential units for commercial purposes without prior approval from the relevant agencies. While the owners benefit with more rental income, this affects the stock of residential units and contributes towards overall housing shortage. As such, a need exists to prevent such deviation through effective monitoring and enforcement.
- ***Review and revision of Housing Policy 2002:*** While many of the provisions of the existing housing policy are relevant today, the various institutional reforms and changing socioeconomic parameter of urban areas need to be taken into account. As such, there is a need to review the 2002 housing policy, and to consider incorporating the principles of affordability, accessibility, inclusiveness and sustainability in housing. This may require corresponding rearrangement of institutional mechanisms that are applicable to the current scenario, by defining clear roles and responsibilities of the key players in the housing sector, in addition to addressing other limitations of the existing policy.

4.5 Disasters

Bhutan is prone to multiple natural hazards owing to fragile geological conditions, steep terrain, vulnerable ecosystem, variable climatic conditions and active tectonic processes taking place in the Himalayas. Thimphu Throm is vulnerable in particular to earthquakes, flash floods and fires.

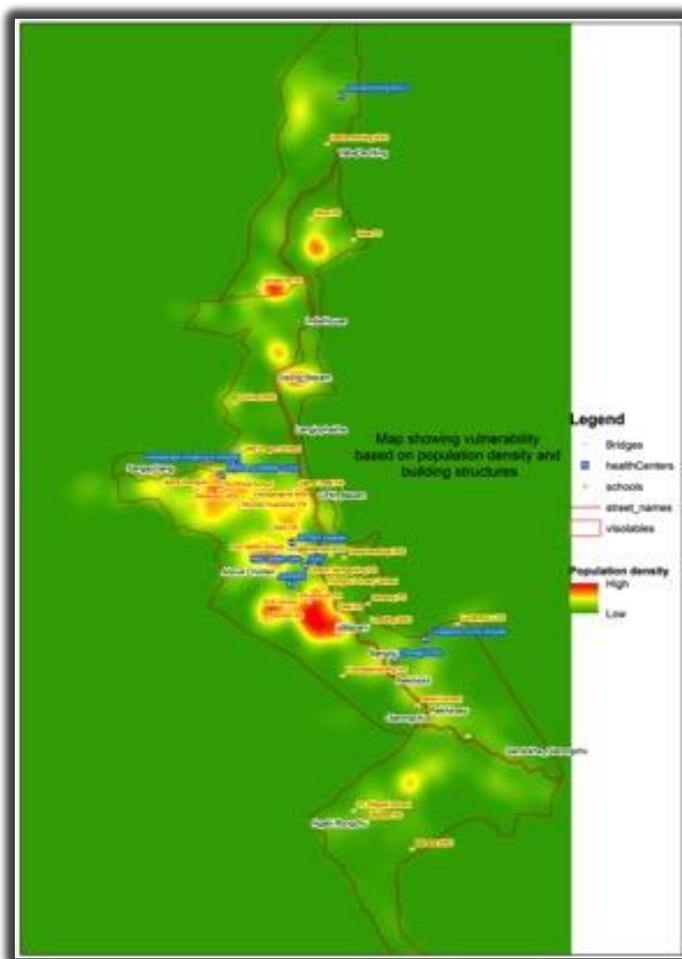
4.5.1 Earthquake

Bhutan lies in one of the most seismically active zones of the world, primarily attributable to the continent-continent collision of the Eurasian-Indian plates. Though recent earthquakes have been moderate in size, geologic evidence indicates that the fault is capable of breaking under most of the country in a single massive earthquake which would lead to unprecedented damages.¹⁸ The September 2009 earthquake with its epicentre in eastern Bhutan was the most severe one to date, causing extensive damage to many structures.

Being in a high-risk seismic zone, earthquakes are expected to be the most damaging of natural hazards that Thimphu Thromde would face. In the event of severe earthquakes, it is assumed that essential infrastructure such as bridges, roads and buildings will collapse, resulting in isolation.

Map 17 shows the areas of probable isolation.

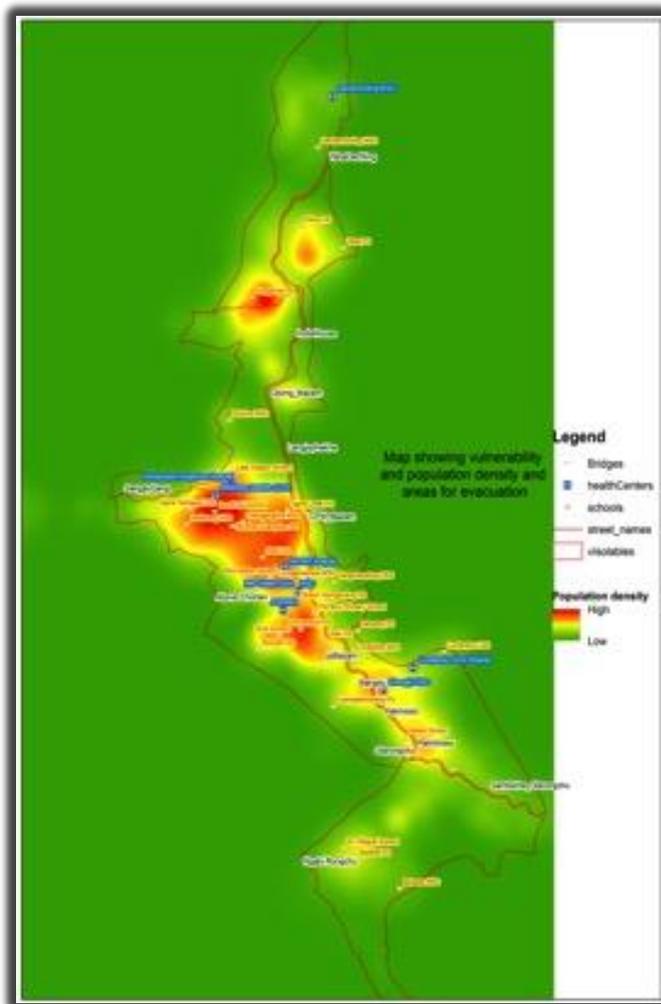
Thimphu Thromde's disaster preparedness is determined by the functionality of key lifeline services such as water supply, electric power supply, sewerage system, fuel supply, food supply, and transportation and communication systems.



Map 17: Earthquake vulnerability based on Population Density and Buildings/Infrastructures

¹⁸ *Thimphu Thromde's Earth Quake Contingency Plan*. 2016

Recommendation: As proposed in the Thromde's earthquake contingency plan, each area will have to be prepared for potential disaster with clear identification of appropriate evacuation centres, and rescue and operational resources. Map 18 shows the vulnerability-based population density during times of severe earthquake and identifies proposed evacuation centres.



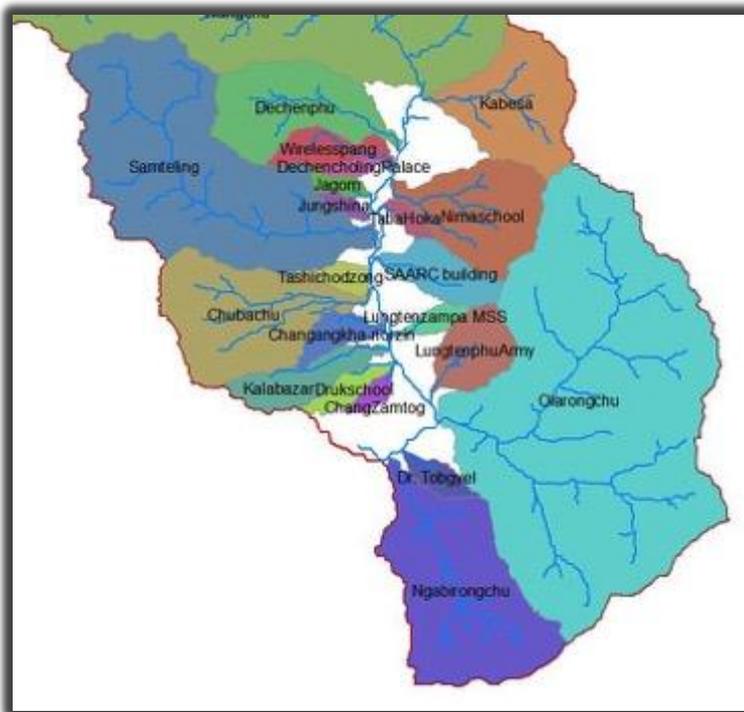
Map 18: Proposed evacuation areas during Earthquake

4.5.2 Flash Floods

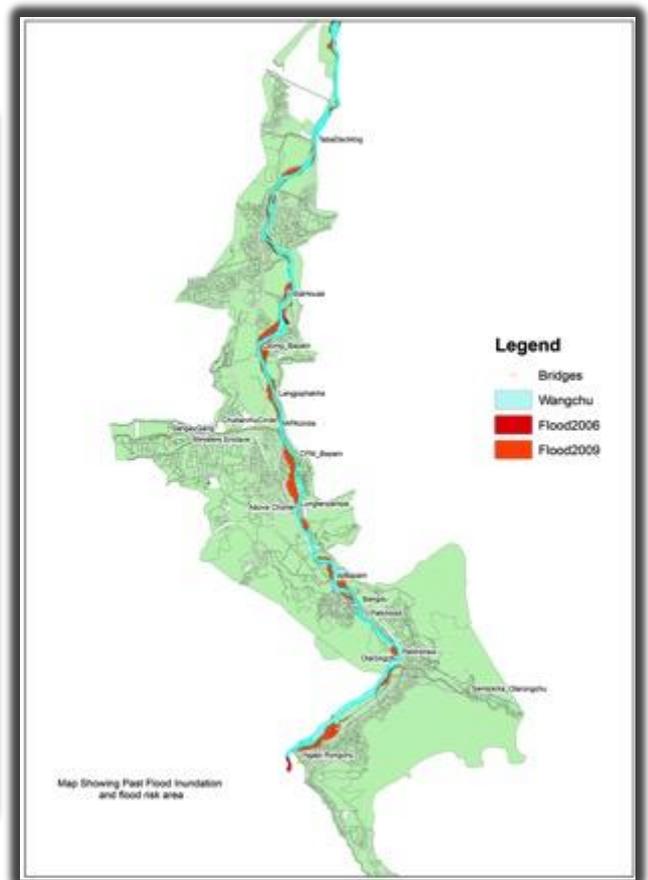
Thimphu experienced the last major flood in 1968. Thereafter in May 2009, it experienced inundation of rivers and streams as a result of Cyclone Alia. The maximum swelling occurred in Olarong Chhu, followed by Samteling Chhu, Ngabirong Chhu and Chuba Chhu. This could be attributed to the encroachment along the river buffer.

The size of the catchment area and their tributaries are shown in Map 19 and Inundation along the Wang Chhu in Map 20. This is also related to the storm water drainage as heavy rainfall causes mini flooding in the Thromde and overflow on the roads.

Therefore, it recommended that as per the requirement of the Forest and Nature Conservation Act, buffer along streams and rivers be studied and maintained to reduce vulnerability during flash floods.



Map 19: Catchment Areas and their Tributaries



Map 20: Inundation along Wangchhu

4.5.3 Fire Hazards

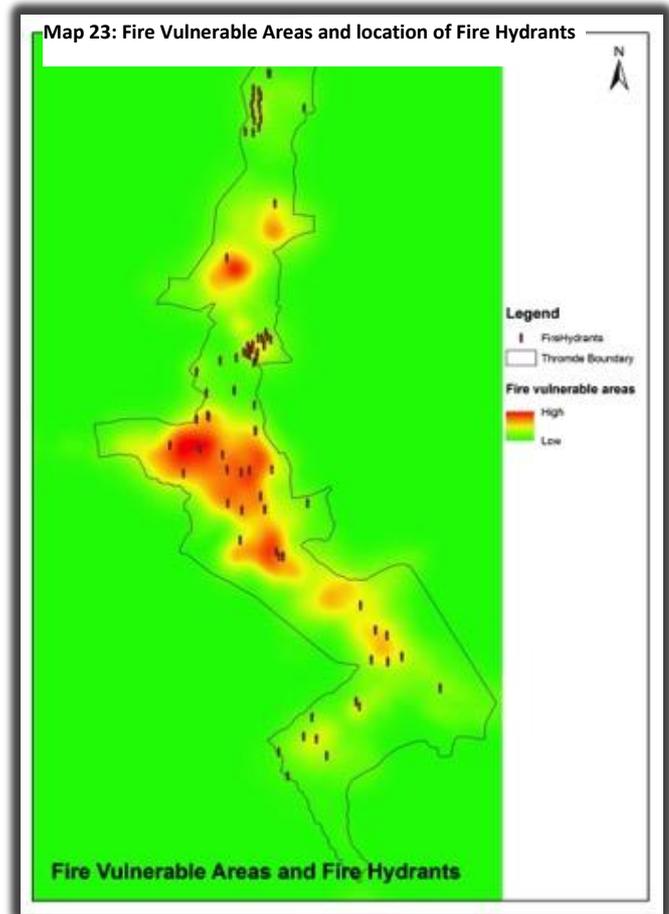
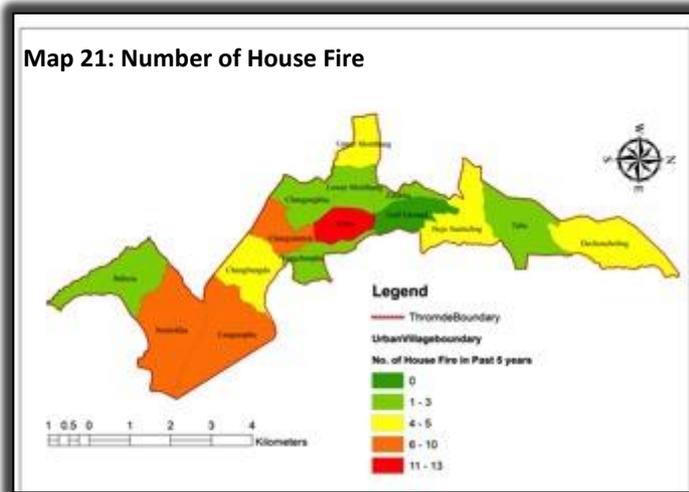
During the last decade, there have been severe outbreaks of forest fire. The fire season is generally during the winter months i.e. November to April. While for most of the forest fires the causes remain uncertain, it is believed that they are mainly caused by anthropogenic activities. Forest fires are one of the major factors contributing to local air pollution.

The immediate causes of vulnerability to hazards include dangerous locations of settlements (due to urbanisation and population pressure coupled with the absence of proper site selection for infrastructural development); lack of hazard zonation map; and weak preparedness, response and relief care.

As mentioned earlier, the Thromde's level of vulnerability during a fire or any other disaster is determined to a great extent by the functionality of key/lifeline services such as water supply, fire hydrants and transportation and communication systems. It would therefore be

important to prioritise the assessment of such lifeline services for Thimphu Thromde to determine its vulnerability to fire and to implement mitigation/strengthening measures at the earliest. Maps 22 and 23 show the location of fire hydrants in Thimphu Thromde. A comparison of the location of fire hydrants and vulnerable fire hazard areas shows that fire hydrants are concentrated in a few areas like Langjophakha. Therefore, it will be important to ensure equal distribution of fire

hydrants in localities across Thimphu Thromde at the earliest. Furthermore, there is an urgent need to implement the Fire Hazard Contingency Plan prepared by Thimphu Thromde in order to minimise the risks of fire hazards and to be prepared to deliver effective response and relief during and in the aftermath of fires.



4.6 Thromde Governance

4.6.1 Current situation

Urban governance refers to how local, regional and national government and other stakeholders decide to plan, finance and manage urban areas. It involves a range of actors and institutions with their inter-linkages and relations impacting developments within the *Thromde*. In managing urban transformations, government at all levels need to play a strategic role in forging partnerships with and among key stakeholders.¹⁹

In accordance with the Local Government Act 2009 and its amendment in 2014, Thimphu Thromde is governed by the *Thromde Tshogde* or the City Council. It comprises eight elected *Thromde Thuemi* or City Councillors, including the *Thrompon* or Mayor who serves as the Chairperson, and an Executive Secretary who is a civil servant.

With decentralisation, the Thromde has a certain level of autonomy but the implementation of policies, plans and programmes are dependent on other government agencies. This includes the MoWHS which is in charge of urban affairs, the Ministry of Home and Cultural Affairs (MoHCA) which oversees the local government, the Ministry of Economic Affairs (MoEA) for issuance of trade licenses, the National Land Commission Secretariat (NLCS) as the apex body for any issue related to land, the Ministry of Finance (MoF) for grant of subsidy and capital budget as well as approval of PAVA (property) rates, and the NECS which oversees development control in the environment precincts.

Therefore, even as Thimphu Thromde is the largest and most visible urban governance actor, much of what affects the urban residents lies outside its direct control. It is largely the market and private businesses, central agencies, and the collective voluntary action of civil society that determine the daily experiences of urban dwellers.

While the TSP was prepared to cater to the needs of all residents and visitors, landowners are mostly interested in developing their properties to maximise returns even if some of their actions deviate from the holistic vision of the TSP. Pressures to revise the TSP are often officially conveyed through the active participation of *Thuemis* in the *Thromde Tshogde*. These *Thuemis* in fact represent only a fraction of the population, as only those residents with their census in Thimphu Throm are eligible to vote in the Thromde elections.²⁰

As such, in principle and on the ground, a minority of *Thromde* residents have disproportionate negotiation power with regard to the TSP; and while numerous presentations and consultation meetings were held with stakeholders and the general public prior to its approval in 2003, wider ownership of the TSP has thus been lacking and non-compliance has been high.

In 2016, the *Thromde* took initiatives to draw up MoUs with service agencies such as Bhutan Telecom, Tashi InfoCom, Bhutan Power Corporation Ltd., and local cable companies. However, the execution of individual projects continues to be challenged by coordination

¹⁹ UNESCAP & UN-Habitat, 2010: 211–12; 2015.

²⁰ During the 2016 Thromde election, there were a total of 7278 registered voters in Thimphu Thromde against a resident population of over 100,000.

issues. As a result, there is continuous digging and laying of service lines that do not necessarily follow the proposed infrastructure plan envisaged in the TSP. Lengthy bureaucratic processes also contribute to delays in the realisation of the goals and objectives envisioned in the TSP.

At the same time, the *TSP 2002-2027* being a long-term framework is by itself not adequate. It needs to be executed through robust action plans that identify funding and budgetary sources, clear division of responsibilities, and specified timelines. At the same time, a prioritisation process will be necessary to ensure that the relevant and appropriate activities are carried out.

4.6.2 Recommendations

- 1) **Address urban governance with an overarching legislation and policy:** Perhaps due a lack of clarity on what urban governance is, various legislation pertaining to it have been repealed several times. Initially there was the Municipal Act of 1999, which was replaced by the *Thromde Act* of 2005. The latter was also repealed with the passage of the LG Act 2006, which in turn was replaced by the LG Act 2009 and its amendment in 2014. However, the urban governance aspects of *Thromdes* are still not adequately addressed by existing relevant legislations.

While the Constitution requires local governments (LG) to be staffed by civil servants, the LG Act mainly addresses the administrative aspects of *Thromde Tshogde*, and the Land Act is rural focused. Although a Spatial Planning Act (currently in draft form) is expected to address issues related to spatial planning, participation, and decision-making, there is no specific policy addressing the complete range of urban governance matters.

Meanwhile, the Supreme Court issued a writ in 2016 for a high-level commission to be constituted to review the “conflicting provisions and harmonise the Local Government Act, Election Act and other related Laws.”²¹ Constituting this high-level commission at the earliest is therefore immensely important to overcoming conflicting provisions and to facilitate effective governance. Appropriate legislation and a dedicated policy for urban governance may also need to be considered.

- 2) **Strengthen stakeholder collaboration and ownership of TSP:** The TSP is a robust plan developed with Bhutan’s GNH vision in mind and had garnered the appreciation of international experts and organisations. Thimphu was also recognised as one of the six sustainable cities in the world.²² The Government on its part expressed its support for the goals of the TSP on several fronts. For instance, while according formal approval of the TSP on 3rd February 2003, the Cabinet issued detailed instructions outlining aspects of the plan that needed to be prioritised and implemented. More recently, the 43rd sitting of the Lhengye Zhungtshog deliberated on and decided not to make much changes to the intensely debated provisions of the Agri-based precincts.²³

²¹ Source required.

²² *What makes a sustainable city?* IMF conference held at Peru in October 2014.

²³ Cabinet instruction no. C-3/43/486 dated 1 August, 2014.

Despite communicating such key decisions and instructions to all ministries and relevant agencies, implementation has been poor. This can be attributed to the general complacency, as well as a lack of coordination, among the relevant officials and agencies responsible for implementing various provisions of the TSP.

Therefore, it is essential that all stakeholders assume greater ownership of the TSP, as it is not possible for one agency to implement it effectively. The *Thromde* is only one of many implementing agencies and is also constrained by its limited authority and capacity. Given that there is a lot at stake when developing the capital city, it is critical that all relevant stakeholders coordinate and update the provisions of the TSP as may be required and execute their respective responsibilities.

To provide a few examples, it would be helpful if agencies took ownership or spearheaded aspects of the TSP as follows:

- The Bhutan Telecom for the provisions related to communications and telecommunication
- The RSTA, MoIC for the long overdue construction of the two bus terminals
- The Royal Securities Exchange (RSEB) or Royal Monetary Authority (RMA) for the construction of the stock exchange building on the land that is reserved for it
- The Ministry of Foreign Affairs (MoFA) for the land reserved for diplomatic enclave.

For successful coordination among the various actors, it will be necessary for agencies to assume greater responsibility over provisions in the TSP that pertain to their mandate and expertise. Likewise, the engagement of local residents, businesses, CSOs, etc., will also be important.

At the same time there are initiatives already being taken that contribute to improving liveability and aesthetics in and around Thimphu Throm. Although not featured in the TSP, an example is the development of cycling and walking trails along the ridges in the forests around Thimphu—an initiative of the Department of Forests, MoAF, with the contribution of physical labour by cycling and nature enthusiasts, and other volunteers. Such initiatives must be acknowledged and further strengthened, as it is being done for the collective benefit of residents and is also in tune with the spirit of GNH and the TSP.

- 3) *Strengthen human resource capacity of the Thromde:*** To facilitate the *Thromde* in providing effective and efficient services as expected by the general public, it will be necessary to strengthen its human resource capacities (in terms of quality and numbers) at various levels. The day-to-day and long-term performance of the *Thromde* would benefit if key leadership positions such as that of the Executive Secretary, Division Chiefs, Administration and Finance, Project Managers, etc. are taken up by experienced, motivated and learned individuals.

Since LGs are required to be staffed by civil servants, this would require the consistent support of the Royal Civil Service Commission (RCSC) and relevant central agencies for

the periodic posting of such individuals on secondment or deputation. It may be necessary to incentivise these positions with job-appropriate training opportunities and performance-based promotions. Likewise, it may also be necessary to provide appropriate incentives for other general staff of the Thromde. Such measures will be important since the Thromde is generally not considered an attractive place to work among civil servants with many reluctant to be posted there.

- 4) **Explore domestic resource mobilisation:** While central agencies are generally responsible for mobilising resources to finance infrastructure projects, the Thromde can also support this effort in significant ways. A case in point is the Thromde's application of the Cash Payment in Lieu of Land Compensation (CPLC) in Changzamtok, which generated about Nu. 35 million towards investment for infrastructure improvement. This idea may also be implemented in other areas and possibly mainstreamed where physical land contribution is not possible. Periodic guidance and handholding by the Ministry of Finance (MoF) may also be useful in the long run.
- 5) **Expand partnerships for development:** The engagement of the private sector in developing the capital city has so far been limited to contractors participating in fragmented, stand-alone projects; there is a need to explore wider partnerships and engage more productively for the mutual benefit of the Thromde and the private sector. Community engagement is still largely confined to consultations during the planning phase; it will be useful to consider deeper levels of engagement by exploring potential avenues of participation in projects during the implementation and monitoring phases as well. So far there has been no participation and/or engagement of the CSOs; encouraging and engaging them as partners of development could prove to be useful.
- 6) **Mainstream inclusiveness:** During its planning phase, the TSP was presented and discussed with a range of stakeholders; maps were widely circulated in the media and comments were solicited both in writing and through online portal. However, public participation in the consultations was limited with most residents including those who do not own land/property not showing much interest. Moreover, the poor and disadvantaged residing within the Thromde do not have an opportunity to voice their concern, even as they tend to be most vulnerable to unfavourable living conditions and suboptimal services.

There is thus a need for Thimphu Thromde and relevant agencies to develop strategies and guidelines for mainstreaming inclusiveness in the planning, implementation and monitoring processes of the TSP. Any plan should be inclusive and should not exclude the needs of any residents of the *Thromde*. The fact that majority of the Thromde population are not eligible to participate in Thromde elections will also need to be taken into account when developing strategies to better engage residents in the implementation of the TSP.

- 7) **Institute Thromde Technical Committee:** The *Thromde Tshogde* is burdened with having to deliberate on too many issues that are technical in nature. This observation was also highlighted during the recent Thromde coordination meetings chaired by the MoWHS Minister in Gelephu and Phuntsholing.

It is therefore recommended that a Thromde Technical Committee be established. This will allow technical issues to be thoroughly discussed by those with the necessary expertise before they are screened for decision by the Thromde *Tshogde*.

- 8) Establish an asset/property inventory and a central registry of taxpayers to facilitate revenue generation and attain fiscal sustainability:** In July 2012, the Government approved a finance policy for the Thromdes. According to the policy document, the urban population could reach 50 percent of the total population by 2020, requiring strengthened efforts at ensuring the sustainability of essential services within the *thromde*. To this end, it would be important to facilitate the direct participation of the people in the development and financial management of their social, economic and environmental wellbeing.²⁴

Currently, *thromdes* receive adequate financial resources from the Government in the form of annual grants and will continue to do so until they are able to sustain on their own resources. Revenue generation through domestic sources is important as local politicians and bureaucrats will be held more accountable if public services are financed through local taxes paid by residents. Sourcing revenue through local sources is also an important pillar of fiscal decentralisation. In line with the *Thromde* finance policy, there should be a timeframe for *thromdes* to become self-sufficient and attain fiscal sustainability, at least in terms of meeting the current costs from their own revenue.

The four *thromdes* have also signed Annual Performance Agreements with the Prime Minister for 2016-2017 and one of the objectives is to: “Enhance annual revenue generation and strive towards financial sustainability and autonomy”. However, there are limitations to how much the *Thromde* authorities can do to mobilise more resources. At the same time, there are opportunities for the larger *Thromdes* to enhance revenue generation, some of which include the review and revision of service fees, taxes and duties; introducing toll fees; and maintaining a proper inventory for taxation purpose.

As highlighted in the Royal Audit Authority reports (AIN 12608, 14732 and 15086), it is recommended that the *Thromde* come up with an asset/property inventory and a central register of taxpayers.

Furthermore, MoWHS has been coordinating the municipal finance & management reforms in the four *thromdes* under Component 1 of Second Bhutan Urban Development Project (BUDP-II), supported through the World Bank’s IDA Credit. The objective of the project is to strengthen the local government expenditure management and financial management systems, so that *thromdes* become sustainable in the long run, based on sound financial management principles. It will help achieve long-term financial sustainability and overall capacity to meet the needs and challenges of rapid urban growth.

The project enables computerisation of tax records and asset register. In Thimphu, steps are also underway to put in place user-friendly citizen interface such as SMS alerts

²⁴ As recommended in the Fiscal Decentralization in Bhutan, 2017 (Full source/document title required)

for tax dues and payment of utility bills. As per records maintained by Thimphu Thromde, about Nu. 150 million has been collected using the system, thus already helping the Thromde in generating more revenue.

- 9) ***Finance the construction of a Town Hall for the capital city:*** The Thimphu Thromde was first established as the Thimphu City Corporation in the 1990s. However, the capital city still does not have a town hall or proper space within the Thromde office where public consultations and meetings can be held. Currently, most of these are being conducted in open spaces which is not conducive for productive meetings. While a plot of land has been reserved, and the Thromde has completed the design and drawings, the construction of the town hall requires financing. Therefore, it is recommended that the MoF approve the budget.

5 SWOT ANALYSIS

Strength, Weakness, Opportunities and Threat (SWOT) is generally used for planning, development and decision-making, and has been widely applied to environmental planning and resource management.²⁵ Based on the assessment of the key issues, the SWOT analysis for this SEA of the TSP was conducted to determine the alternatives available for Thimphu Thromde's sustainable development henceforth.

It identifies the internal strength and weakness of the TSP in relation to the two Scenarios and assesses the possible opportunities and threats. Therefore, the analysis takes into consideration the two projected population possibilities of 160,000 and 200,000 that will need to be accommodated within the TSP by 2027.

Based on these two scenarios, infrastructure needs were computed and compared with the capacity needs. The analysis will help in providing decision-makers with a picture of the possibilities and therefore facilitate with their selection of the alternatives.

²⁵ AHRD 2001, Baser 2001: Full source citation required

SCENARIO 1: POPULATION – 160,000

SWOT ANALYSIS FOR SEA OF THIMPHU STRUCTURAL PLAN

INTERNAL FACTORS	
STRENGTHS (+)	WEAKNESSES (-)
<p>1. Designated residential precinct (UV and E-4); building regulations; private sector (Yangphel real estate) and state developers (NPPF, NHDC, Corporate and Armed Forces staff quarters; housing policy in place.</p> <p>2. Presence of Wang Chhu; untapped surface water resources; government and non-governmental institutions with strong conservation legislations in place; proposed Thimphu watershed management plan; existence of water treatment plants.</p> <p>3. Adequate sewerage infrastructure in place with some under construction.</p> <p>4. National Integrated Solid Waste Management Strategy 2014; privatisation of waste collection services; involvement of scrap dealers; continuous advocacy conducted; schools practicing 3Rs (reduce, reuse and recycling); segregation at source practiced to some extent; established waste collection and transportation; existence of transfer stations; small scale rehabilitation of existing landfill.</p> <p>5. Existence of institutions like Department of Disaster Management (DDM); Search and Rescue (SAR); <i>Thromde</i> contingency plans (specifying hazard zonation and vulnerability mappings); DeeSupps; Armed Forces; emergency operation centre; advocacy and awareness on disaster.</p> <p>6. Draft National Transport Policy; City Bus Services in place; government support to promote EV; availability of E-Taxis; road infrastructure place; intercity and intracity bus terminal in the plans.</p> <p>7. Constitutional mandate (60 percent forest cover, conserve and improve the environment and safeguard the country's biodiversity, protection for private properties and provision for acquisition for public purpose); LG Act; draft Human Settlement Policy and draft Spatial Planning Act in Place; community and public representation in the <i>Thromde</i> for decision making.</p>	<p>1. Energy inefficient buildings; expensive to develop and not affordable or accessible to vulnerable groups; weak implementation (Tenancy Act, BBR, DCR, deviation from approved plans); lack of funds for LAP implementation; lack of open space for social interaction (conviviality); slow growth/development leading to land-use change overtime; existence of informal settlement.</p> <p>2. Poor water management practices (metre issue); lack of data; coordination between various agencies dealing with water resources; old water supply infrastructure leading to excessive losses; no provision to connect new households; water quality does not meet minimum standard; shortage of water supply due to inefficient water network, distribution and management system (<u>No Deficit in this scenario</u>).</p> <p>3. Poor management, weak enforcement and poor compliance; deficit in treatment capacity 2.7 MLD (2027).</p> <p>4. High per capita waste generation (0.62 kgpcd x 160,000 = 99,200 kg or 99.2 MT); consumeristic society; poor management; ineffective waste segregation culture; lack of civic public responsibility; exceeded existing landfill capacity; existing landfill is a dump yard and does not quality as landfill; effluents from automobile services discharged without treatment.</p> <p>5. Low public awareness; resource constraints (limited manpower, equipment, knowledge expertise and experience); coordination issues; fragile landscape; rugged terrain; overcrowding; low preparedness.</p> <p>6. Poor planning and design of traffic circulation leading to traffic congestion in urban core; less number of city bus fleet and low frequency; limited parking space and on-street parking; limited space for road widening; low preference for public transport; increasing private car ownership and taxis; non-implementation of NNS; low mobility (inaccessible to persons with disability) due to lack of continuous, safe and walkable footpath system and cycle lanes.</p> <p>7. Coordination issues; no ownership over TSP for implementation from all agencies; high staff turnover; weak implementation and compliance of legislations; lack of specific legislations and systems.</p>

EXTERNAL FACTORS

OPPORTUNITIES (+)	THREATS (-)
<ol style="list-style-type: none"> 1. Enhanced technology; quality building materials, increased demand for housing due to increasing income and population; availability of financing; employment; access to affordable housing and home ownership. 2. Funding windows (GEF, GCF, ADB, WB, KEI, etc.); water; use of advanced water saving technologies; Payment for Ecosystem Services (PES); strengthen database for natural resources management (water); uphold carbon-neutral pledges. 3. Technologies for sewerage rehabilitation and replacement; advanced engineering tool/techniques; public awareness, sensitisation and advocacy. 4. Introduction of innovative green technologies; promote PPP models for waste management; privatisation of waste management; economic opportunities; promotion of organic and local products; revisit fee structure for waste services; promote civic education and effective implementation of legislation. 5. Enhance preparedness through implementation of contingency plan and mock drills; reducing disaster risks; transferring risk; introduce advanced technologies to build disaster resilient infrastructures, partnership with international organisations. 6. Introduce best practices from neighbouring countries; clean and green mobility (e-taxi, electric bus, hybrid, e-car); alternate mode of transport (light rails, water-ways, cable cars); pedestrianisation; NNS; promotion of PPP; introduce Intelligent Transport and mobility System (an advanced application for a better informed, safer, more coordinated and smarter use of transport and mobility networks); parking control and revenue collection; institutional reforms; uphold carbon-neutral pledges. 7. Institutional process and system reforms; promotion of e-governance; enhance collaboration and information sharing among stakeholders; formulate specific legislations; human, financial, technical and technology capacity development. 	<ol style="list-style-type: none"> 1. Housing boom; unaffordable housing leading to growth of slums; homeless (elderly); catastrophic degree is high during disaster; encroachment on state land; land-use change (agriculture and forest); loss of NNS; loss of biodiversity; cultural dilution. 2. Climate change impacts-drying of water sources impacting water security; water pollution and contamination; increasing demand (water for commercial use); outbreak of waterborne diseases; threat on agriculture and food security. 3. Outbreak of diseases causing health hazards. 4. Population growth; becoming consumeristic society; health hazards; pollution; impacts of economic growth. 5. Climate change impacts (flash flood, cloud burst, wind storm); fire, earthquake, epidemics, accidents, social and economic shocks and disruption. 6. Public preference-use for private cars; high costs (electric vehicles cost more than conventional vehicles); fossil fuel vehicle dominance; pollution and health risks (affecting elderly, children, less affluent sections of society); traffic congestion; challenge of managing waste from automobiles. 7. Red tape (excessive bureaucracy or adherence to official rules and formalities); corruption; political and public pressure; lack of funds.

SCENARIO 2: POPULATION – 200,000

SWOT ANALYSIS FOR SEA OF THIMPHU STRUCTURAL PLAN

INTERNAL FACTORS	
STRENGTHS (+)	WEAKNESSES (-)
<p>1. Designated residential precinct (UV and E-4); building regulations; private sector (Yangphel real estate) and state developers (NPPF, NHDC, Corporate and Armed Forces staff quarters); housing policy in place.</p> <p>2. Presence of Wang Chhu; untapped surface water resources; government and non-governmental institutions with strong conservation legislations in place; proposed Thimphu Watershed Management Plan; existence of water treatment plants.</p> <p>3. Adequate sewerage infrastructure in place with some under construction.</p> <p>4. National Integrated Solid Waste Management Strategy 2014; privatisation of waste collection services; involvement of scrap dealers; continuous advocacy conducted; schools practicing 3Rs (reduce, reuse and recycling); segregation at source practiced to some extent; established waste collection and transportation; existence of transfer stations; small scale rehabilitation of existing landfill.</p> <p>5. Existence of institutions like Department of Disaster Management (DDM); Search and Rescue (SAR); <i>Thromde</i> contingency plans (specifying hazard zonation and vulnerability mappings); DeeSup; Armed Forces; emergency operation centre; advocacy and awareness on disaster.</p> <p>6. Draft National Transport Policy; City Bus Services in place; government support to promote EV; availability of E-Taxis; road infrastructure in place; intercity and intracity bus terminal in the plans.</p> <p>7. Constitutional mandate (60 percent forest cover, conserve and improve the environment and safeguard the country's biodiversity, protection for private properties & provision for acquisition for public purpose); LG Act; draft Human Settlement Policy and draft Spatial Planning Act in place; community and public representation in the <i>Thromde</i> for decision making.</p>	<p>1. Energy inefficient buildings; expensive to develop, and not affordable and accessible to vulnerable groups; weak implementation (Tenancy Act, BBR, DCR, deviation from approved plans); lack of funds for LAP implementation; lack of open space for social interaction (conviviality); slow growth/development leading to land-use change overtime; existence of informal settlement.</p> <p>2. Poor water management practices (metre issue); lack of data; poor coordination between various agencies dealing with water resources; old water supply infrastructure leading to excessive losses; no provision to connect new households; water quality does not meet minimum standard; shortage of water supply due to inefficient water network, distribution and management system (Deficit in 2017 2.9 MLD and Deficit in 2027 is 4.1 MLD).</p> <p>3. Poor management, weak enforcement and poor compliance; deficit treatment capacity (7.5 MLD in 2027).</p> <p>4. High per capita waste generation (0.62 kgpcd x 200,000 = 124,000 kg or 124 MT); consumeristic society; poor management; ineffective waste segregation culture; lack of civic public responsibility; exceeded existing landfill capacity; existing landfill is a dump yard and does not quality as landfill; effluents from automobile services discharged without treatment.</p> <p>5. Low public awareness; resource constraints (limited manpower, equipment, knowledge expertise and experience); coordination issues; fragile landscape; rugged terrain; overcrowding; low preparedness.</p> <p>6. Poor planning and design of traffic circulation leading to traffic congestion in urban core; less number of city bus fleet and low frequency; limited parking space and on-street parking; limited space for road widening; low preference for public transport; increasing private car ownership and taxis; non-implementation of NNs; low mobility (inaccessible to persons with disability) due to lack of continuous, safe and walkable footpath system and cycle lanes.</p> <p>7. Coordination issue; no ownership over TSP for implementation from all agencies; high staff turnover; weak implementation and compliance of legislations; lack of specific legislations and systems.</p>

EXTERNAL FACTORS

OPPORTUNITIES (+)	THREATS (-)
<ol style="list-style-type: none"> 1. Enhanced technology; quality building materials; increased demand for housing due to increasing income and population; availability of financing; employment; access to affordable housing and home ownership. 2. Funding windows (GEF, GCF, ADB, WB, KEI, etc.); water; use of advanced water saving technologies; Payment for Ecosystem Services (PES); strengthen database for natural resources management (water); uphold carbon-neutral pledges, 3. Technologies for sewerage rehabilitation and replacement; advanced engineering tool/techniques; public awareness, sensitisation and advocacy. 4. Introduction of innovative green technologies; promote PPP models for waste management; privatisation of waste management; economic opportunities; promotion of organic and local products; revisit fee structure for waste services; promote civic education and effective implementation of legislation. 5. Enhance preparedness through implementation of contingency plan and mock drills; reducing disaster risks; transferring risk; introduce advanced technologies to build disaster resilient infrastructures; partnership with international organisations. 6. Introduce best practices from neighbouring countries; clean and green transport (e-taxi, electric bus, hybrid, e-car); alternate mode of transport (light rails, water-ways, cable cars); pedestrianisation; NNs; promotion of PPP; introduce Intelligent Transport and Mobility System (an advanced application for a better informed, safer, more coordinated and smarter use of transport and mobility networks); parking control and revenue collection; institutional reforms; uphold carbon-neutral pledges 7. Institutional process and system reforms; promotion of e-governance; enhance collaboration and information sharing among stakeholders; formulate specific legislations; human, financial, technical and technology capacity development. 	<ol style="list-style-type: none"> 1. Housing boom; unaffordable housing leading to growth of slums; homeless (elderly); catastrophic degree is high during disaster; encroachment on state land; land-use change (agriculture and forest), loss of NNs; loss of biodiversity; cultural dilution. 2. Climate change impact-drying of water sources impacting water security; water pollution and contamination; increasing demand (water for commercial use); outbreak of waterborne diseases; threat on agriculture and food security. 3. Outbreak of diseases causing health hazards 4. Population growth, becoming consumeristic society, health hazards, pollution, impacts economic growth. 5. Climate Change impacts (flash flood, cloud burst, wind storm); fire; earthquake; epidemics; accidents; social and economic shocks and disruption. 6. Public preference for use of private cars; high costs (electric vehicles cost more than conventional vehicles); fossil fuel vehicle dominance; pollution and health risks (affecting elderly, children, less affluent sections of society); traffic congestion; challenge of managing waste from automobiles. 7. Red tape (excessive bureaucracy or adherence to official rules and formalities); corruption; political and public pressure; lack of funds.

Further, strategic options have been identified using the SWOT and TOWS (Threats, Opportunities, Weakness and Strength) tool.

<u>TOWS (HOUSING)</u>	Strength	Weakness
	Designated residential precinct (UV and E-4); building regulations; private sector (Yangphel Real Estate) and state developers (NPPF, NHDC, Corporate and Armed Forces staff quarters); housing policy in place.	Energy inefficient buildings; expensive to develop, not affordable and accessible to vulnerable groups; weak implementation (Tenancy Act, BBR, DCR, deviation from approved plans); lack of funds for LAP implementation; lack of open space for social interaction (conviviality); slow growth/development leading to land-use change overtime; existence of informal settlement.
Opportunity Enhanced technology; quality building materials; increased demand for housing due to increasing income and population; availability of financing; employment; access to affordable housing and home ownership.	<ul style="list-style-type: none"> a) Develop designated residential precinct to address affordability issue b) Promote affordable housing integrating space for social interaction 	<ul style="list-style-type: none"> a) Need to identify and create more recreational areas and open space b) Enhance energy efficiency of existing residential buildings c) Enforcement of existing legislations d) Promote conviviality e) Encourage fast housing development
Threat Housing boom; unaffordable housing leading to growth of slums, homeless (elderly); catastrophic degree is high during disaster; encroachment on state land; land-use change (agriculture and forest); loss of NNs. Loss of biodiversity; cultural dilution.	<ul style="list-style-type: none"> a) Building disaster resilient housing 	<ul style="list-style-type: none"> a) Mobilise resources for LAP implementation including exploring different forms of implementation modality such as PPP. Advocate and sensitise on each LAP to relevant agencies. b) Promote affordable and inclusive housing

<p><u>TOWS (WATER)</u></p>	<p>Strength</p> <p>Presence of Wang Chhu; untapped surface water resources; government and non-governmental institutions with strong conservation legislations in place; proposed Thimphu watershed management plan; existence of water treatment plants.</p>	<p>Weakness</p> <p>Poor water management practices (metre issue); lack of data; coordination between various agencies dealing with water resources; old water supply infrastructure leading to excessive losses; no provision to connect new households; water quality does not meet minimum standard; shortage of water supplied due to inefficient water network, distribution and management system (<i>No Deficit in this scenario</i>).</p>
<p>Opportunity</p> <p>Funding windows (GEF, GCF, ADB, WB, KEI etc) water, use of advanced water saving technologies, Payment for Ecosystem Services (PES). Strengthen data base for natural resources management (water). uphold Carbon-Neutral pledges,</p>	<ul style="list-style-type: none"> a) Develop water supply master plan b) 24/7 equitable distribution of water supply ensuring safe drinking water c) Protect water sources to ensure sustainability of water supply in Thimphu Throm d) Promote PPP 	<ul style="list-style-type: none"> a) Minimise wastage b) Improve water quality and standards c) Promote demand management measures (implement 100% metering, revisit water tariff, encourage reduction of water wastage and promote use of water saving devices).
<p>Threat</p> <p>Climate Change Impact-drying of water sources impacting water security, Water pollution and contamination, increasing demand (water commercial use), outbreak of water borne diseases; threat on agriculture and food security.</p>	<ul style="list-style-type: none"> a) Watershed protection b) Protect and conserve natural streams of Thimphu c) Support effective implementation of Thimphu watershed management plan 	<ul style="list-style-type: none"> a) Diagnostic study on optimisation of existing water distribution scheme b) Renovate old water supply infrastructure

<p><u>TOWS (SEWERAGE)</u></p>	<p>Strength</p> <p>Adequate sewerage infrastructure in place with some under construction.</p>	<p>Weakness</p> <p>Poor management; weak enforcement and poor compliance; <i>deficit in treatment capacity 2.7 MLD (2027).</i></p>
<p>Opportunity</p> <p>Technologies for sewerage rehabilitation and replacement, advanced engineering tool/techniques, public awareness, sensitisation and advocacy.</p>	<p>a) Develop sewerage master plan</p> <p>b) Introduce advanced technologies</p>	<p>a) Provide advocacy and awareness on sewerage management</p> <p>b) Augment existing STP and construct new STP for population scenario of 200,000</p> <p>c) Promote innovative treatment technologies (centralised or onsite) for sewerage treatment system</p>
<p>Threat</p> <p>Outbreak of diseases causing health hazards</p>	<p>a) Promote effective management of sewerage and its treatment</p>	<p>a) Construct additional sewerage infrastructure</p> <p>b) Advocacy and awareness</p>

<u>TOWS (SOLID WASTE)</u>	Strength	Weakness
<p>Opportunity</p> <p>Introduction of innovative green technologies; promote PPP models for waste management; privatisation of waste management; economic opportunities; promotion of organic and local products; revisit fee structure for waste services; promote civic education and effective implementation of legislation.</p>	<p>National Integrated Solid Waste Management Strategy 2014; privatisation of waste collection services; involvement of scrap dealers; continuous advocacy conducted; schools practicing 3Rs (reduce, reuse and recycling); segregation at source practiced to some extent; established waste collection and transportation; existence of transfer stations; small scale rehabilitation of existing landfill.</p> <p>a) Promote and implement 3Rs</p> <p>b) Implement source segregation and promote composting</p>	<p>High per capita waste generation (0.62 kgpcd x 160,000 = 99,200 kg or 99.2 MT); consumeristic society; poor management; ineffective waste segregation culture, lack of civic public responsibility; exceeded existing landfill capacity; existing landfill is a dump yard and does not quality as landfill; effluents from automobile services discharged without treatment.</p> <p>a) Implement efficient solid waste management infrastructure and services</p>
<p>Threat:</p> <p>Population growth; becoming consumeristic society; health hazards; pollution; impacts of economic growth.</p>	<p>a) Strict enforcement of solid waste management policies, rules and regulations</p> <p>b) Advocacy and awareness on solid waste management</p> <p>c) Revisit tariff structure for solid waste management</p>	<p>a) Secure and rehabilitate Memelakha landfill</p> <p>b) Promote use of initiative technologies for efficient treatment of waste from automobile service sectors</p> <p>c) Outsourcing of waste management infrastructure and services through innovative forms of PPP and community partnerships</p> <p>d) Additional transfer stations in north and central Thim Throm (Scenario 2)</p> <p>e) Construct sanitary landfill (Scenario 2)</p>

<p><u>TOWS (DISASTER)</u></p>	<p>Strength</p> <p>Existence of institutions like Department of Disaster Management (DDM); Search and Rescue (SAR); <i>Thromde</i> contingency plans (specifying hazard zonation and vulnerability mappings); DeeSups; Armed Forces; emergency operation centre; advocacy and awareness on disaster.</p>	<p>Weakness</p> <p>Low public awareness; resource constraints (limited manpower, equipment, knowledge expertise and experience); coordination issues; fragile landscape; rugged terrain; overcrowding; low preparedness.</p>
<p>Opportunity</p> <p>Enhance preparedness through implementation of contingency plan and mock drills; reducing disaster risks; transferring risk; introduce advanced technologies to build disaster resilient infrastructures; partnership with international organisations.</p>	<p>a) Develop storm water master plan</p>	
<p>Threat</p> <p>Climate change impacts (flash flood, cloud burst, wind storm); fire; earthquake, epidemics; accidents; social and economic shocks and disruption.</p>	<p>a) Protect fragile ecosystem, hill slopes and river basins</p>	<p>a) Reassign the land-use or precinct based on a thorough slope and aspect analysis and geo-technical studies.</p> <p>b) Develop and implement regulations and guidelines for development on steep slopes and very steep slopes.</p> <p>c) Introduce innovative treatment technologies for storm water prior to being drained into the Wang Chhu.</p>

<u>TOWS (Transport and Mobility)</u>	Strength	Weakness
	<p>Draft National Transport Policy; City Bus Services in place; government support to promotion of EV; availability of E-Taxis; road infrastructure in place; intercity and intracity bus terminal in the plans.</p>	<p>Poor planning and design of traffic circulation leading to traffic congestion in urban core; less number of city bus fleet and low frequency; limited parking space and on street parking; limited space for road widening; low preference for public transport; increasing private car ownership and taxis; non-implementation of NNs; low mobility (inaccessible to persons with disability) due to lack of continuous and safe footpath system and cycle lanes.</p>
<p>Opportunity</p> <p>Introduce best practices from neighbouring countries; clean and green transport (e-taxi, electric bus, hybrid, e-car); alternate mode of transport (light rails, water-ways, cable cars); pedestrianisation; NNs; promotion of PPP; introduce Intelligent Transport System (an advanced application for a better informed, safer, more coordinated and smarter use of transport networks, parking control and revenue collection); institutional reforms, uphold carbon-neutral pledges.</p>	<p>a) Develop transport mobility plan to improve bus services and increase demand of ridership</p> <p>b) Promote EV and provide required infrastructure facilities such as parking space and fast charging stations</p> <p>c) Introduce intelligent transport system for efficient surveillance and maintenance; to promote smooth traffic flow, use of modern method to parking control and parking revenue collection</p> <p>d) Promote BRT along the main urban corridor (Scenario 2).</p>	<p>a) Improve mobility through terminal arrangement for every route, bus stops and shelters that are integrated with pavement, footpath and cycle path</p> <p>b) Implement NNs to reduce frequency of trips made to the urban core</p> <p>c) Mandate to maintain adequate parking space for all residential buildings</p> <p>d) Monitor compliance of DCR</p>
<p>Threat</p> <p>Public preference-use of private cars; high costs (electric vehicles cost more than conventional vehicles); fossil fuel vehicle dominance; pollution and health risks (affecting elderly, children, less affluent sections of society); traffic congestion; challenge of managing waste from automobile.</p>	<p>a) Establish dedicated transport division with mandate on Thimphu Thromde to focus on transport planning, monitoring, traffic management, sidewalk management and landscaping, setting standards, developing SOPs and ensuring strict compliance of service level by bus operations</p>	<p>b) Ensure reliability of bus services; allocate dedicated bus lane and alternative traffic arrangement.</p> <p>c) Promote pedestrianisation through development of continuous and safe footpath system and cycle lanes</p>

<p><u>TOWS (Governance)</u></p>	<p>Strength</p> <p>Constitutional mandate (60% forest cover, conserve and improve the environment and safeguard the country's biodiversity, protection for private properties and provision for acquisition for public purpose); LG Act; draft Human Settlement Policy and draft Spatial Planning Act in place; community and public representation in the <i>Thromde</i> for decision making.</p>	<p>Weakness</p> <p>Coordination issues; no ownership over TSP for implementation from all agencies; high staff turnover; weak implementation and compliance of legislations; lack of specific legislations and systems.</p> <p>5.1</p>
<p>Opportunity</p> <p>Institutional process and system reforms; promotion of e-governance; enhance collaboration and information sharing among stakeholders; formulate specific legislations; human, financial, technical and technology capacity development.</p>	<p>a) Establish asset/property inventory and central registry of tax payers</p> <p>b) Urban infrastructure and construction guideline related to monitoring and evaluation for quality and workmanship</p>	<p>a) Review the number of precincts proposed in TSP to reduce number of precincts categories</p> <p>b) Explore domestic resource mobilisation for infrastructure and services</p> <p>c) Develop strategies and guideline to mainstream inclusiveness for the poor, disadvantaged and vulnerable people in the planning, implementation and monitoring process</p>
<p>Threat</p> <p>Red tape (excessive bureaucracy or adherence to official rules and formalities); corruption; political and public pressure; lack of funds.</p>		<p>a) Strengthen Thromde's HR capacity</p> <p>b) Encourage and engage CSOs, private sector and communities during planning phase of polices and engage them during implementation and monitoring phase</p> <p>c) Construction of town hall</p> <p>d) Institute Thromde technical committee to thrash out technical issues before they are screened for decision by <i>Thromde Tshogde</i></p>

6 ALTERNATIVES AND WAY FORWARD

6.1 Summary of recommendations

As the SEA deals with the TSP whose planning period ends in 2027, temporal alternatives could not be considered. Since the TSP boundary has been set, expanding the boundary of Thimphu Throm is also not considered a viable option. Therefore, given that population is important for city planning, the population scenarios are set as alternatives for this SEA from the perspective of supply and demand for infrastructure, services and resources.

Table 28 is a synthesis of the recommended courses of action to address prioritised issues, based on the two population scenarios or alternatives that the TSP will have to accommodate.

Table 28: Recommended courses of action for two population scenarios

Issues	Alternatives	
	Scenario 1 (Population of 160,000 in 2027)	Scenario 2 (Population of 200,000 in 2027)
Land-use	Plantations along the river and stream buffer in consultation with WSD, MoAF	
Housing	Develop designated residential precinct to address affordability issue	
	Promote affordable housing integrating space for social interaction	
	Build disaster resilient housing	
	Identify and create more recreational areas and open space	
	Enhance energy efficiency of existing residential buildings	
	Enforce existing legislations	
	Promote conviviality	
	Encourage fast housing development	
	Mobilise resources for LAP implementation including exploring different forms of implementation modality such as PPP. Advocate and sensitise on each LAP to relevant agencies	
	Promote affordable and inclusive housing	
Water	Develop water supply master plan	
	24/7 equitable distribution of water supply ensuring safe drinking water	
	Protect water sources to ensure sustainability of water supply in Thimphu Throm.	
	Promote PPP	
	Watershed protection	
	Protect and conserve natural streams of Thimphu	

	Support effective implementation of Thimphu watershed management plan	
	Minimise wastage	
	Improve water quality and standards	
	Promote demand management measures (implement 100% metering, revisit water tariff, encourage reduction of water wastage and promote use of water saving devices)	
	Diagnostic study on optimisation of existing water distribution scheme	
	Renovate old water supply infrastructure	
Sewerage	Develop sewerage master plan	
	Introduce advanced technologies	
	Promote effective management of sewerage and its treatment	
	Provide advocacy and awareness on sewerage management	
	Augment existing STP	
		Construct new STP for Scenario 2
	Promote innovative treatment technologies (centralised or onsite) for sewerage treatment system.	
Municipal Solid Waste	Promote and implement 3Rs	
	Implement source segregation and promote composting	
	Strict enforcement of solid waste management policies, acts rules and regulations	
	Advocacy and awareness on solid waste management	
	Revisit solid waste tariff structure for solid waste management	
	Implement efficient solid waste management infrastructure and services	
	Secure and rehabilitate Memelakha landfill	
	Promote use of initiative technologies for efficient treatment of waste from automobile service sectors	
	Outsource waste management infrastructure and services through innovative forms of PPP and community partnerships	
		Additional transfer stations in north and central Thim Throm
		Construct sanitary landfill
Disaster	Develop storm water master plan	
	Protect fragile ecosystem, hill slopes, river basins	
	Enhance preparedness through implementation of contingency plan and mock drills, reduce disaster risks, transfer risk, introduce advanced technologies to build disaster resilient infrastructures, partnership with international organisations, uphold carbon-neutral pledges.	

	Re-assign the land-use or precinct based on a thorough slope and aspect analysis and geo-technical studies
	Regulations and guidelines for development on steep slopes and very steep slopes needs to be drafted and implemented
	Innovative treatment technologies introduced for storm water prior to being drained into the Wang Chhu.
Transport	Develop transport mobility plan to improve bus services and increase demand of ridership
	Promote EV and provide required infrastructure facilities such as parking space and fast charging stations
	Introduce intelligent transport system for efficient surveillance and maintenance; to promote smooth traffic flow, use modern methods to parking control and parking revenue collection
	Promote BRT along the main urban corridor (Scenario 2).
	Establish dedicated transport division with mandate on Thimphu Thromde to focus on transport planning, monitoring, traffic management, sidewalk management and landscaping, setting standards, developing SOPs, and ensuring strict compliance of service levels by bus operators
	Improve mobility through terminal arrangement for every routes, bus stops and shelters that are integrated with pavement, footpath and cycle path
	Implement NN to reduce frequency of trips made to the urban core
	Mandate to maintain adequate parking space for all residential buildings
	Monitor compliance of DCR
	Ensure reliability of bus services, allocate dedicated bus lane and alternative traffic arrangement
	Promote pedestrianisation through development of continuous and safe footpath system and cycle lanes
Governance	Establish asset/property inventory and central registry of tax payers
	Urban infrastructure and construction guideline related to monitoring and evaluation for quality and workmanship
	Review the number of precincts proposed in TSP to reduce number of precincts categories
	Explore domestic resource mobilisation for infrastructure and services
	Develop strategies and guidelines to mainstream inclusiveness for the poor, disadvantaged and vulnerable people in the planning, implementation and monitoring process
	Strengthen Thromde's HR capacity
	Encourage and engage CSOs, private sectors, and communities during planning phase of polices and engage them during implementation and monitoring phase
	Construction of town hall
	Institute Thromde technical committee to thrash out technical issues before they are screened for decision by Thromde Tshogde

The alternatives pertaining to both the population scenarios share similarities in their approaches to meeting infrastructure needs, and in their capacities to meet the demands of expected population growth. However, the degree of action that needs to be taken is greater in Alternative 2. As indicated in detail in Section 4 of this report and illustrated in summary above, most of the recommendations for Scenario 1 apply to Scenario 2 and will therefore need to be considered under either scenario. In addition, Scenario 2 with its greater population projection and consequent demands on city infrastructure and resources calls for some additional measures. These include policy interventions and investments to:

- Promote the BRT along the main urban corridor to facilitate the implementation of eco-friendly and efficient public transport and mobility system
- Construct a new sewerage treatment plant
- Construct a new sanitary landfill, and to set up additional (waste) transfer stations in north and central Thimphu

6.2 Next steps

The strategic assessment is, by definition, a highly participatory process that requires the input of all relevant stakeholders including central and local government agencies, the private sector, media, civil society, and local communities. The process is open to all stakeholders and their participation is both welcomed and encouraged, as the outcomes must represent the consensual choice of all participants. Therefore, as previously mentioned, stakeholder consultations have been conducted since the initiation and over the course of the SEA process.

A stakeholder mapping for the SEA process is provided in [Table 29](#).

Table 29: Stakeholder mapping

HIGH Impact	MEDIUM Impact	LOW Impact
Urban Planning Division, Thimphu Thromde	Ministry of Finance	Paro Dzongkhag Administration
Infrastructure Development Division, Thimphu Thromde	National Commission for Women and Children	Punakha Dzongkhag Administration
Environment Division, Thimphu Thromde	Royal Bhutan Army	Wangdue Dzongkhag Administration
Ministry of Works and Human Settlement	Policy and Planning Division, MoAF	Department of Livestock, MoAF
Gross National Happiness Commission	Department of Engineering Services, MoWHS	Department of Roads, MoWHS
National Environment Commission	Department of Culture, MoHCA	
Department of Forest and Park Services, MOAF	Department of Disaster Management, MoHCA	
Department of Human Settlement, MoWHS	Royal Bhutan Police	
Policy and Planning Division, MoWHS	Department of Industry, MoEA	
National Land Commission Secretariat	Ministry of Health	
National Centre for Hydrology and Meteorology	Dratshang Lhentshog, MoHCA	
Department of Geology and Mines, MOEA	Royal Society for the Protection of Nature	
Department of Cottage and Small Industry, MoEA	Clean Bhutan	
Policy and Planning Division, MoEA	Ability Bhutan Society	
Ministry of Education		
Ministry of Information and Communication		
Bhutan Power Corporation		
Bhutan Chamber of Commerce and Industry		
Tourism Council of Bhutan		
Thimphu Dzongkhag Administration		

Moving forward, this participatory process will continue as it is critical to ensure the widest possible support for the SEA recommendations, through wide dissemination of outcomes to all stakeholders. As such, the communication and stakeholder consultation plan that was designed as part of the SEA process will continue to be implemented. This plan, which is applicable for the duration of the SEA process i.e. beginning with the scoping phase and through till the endorsement of the SEA report and its recommendations, is provided in [Annex 5](#). Also provided are additional documents pertaining to the consultations that have taken place till date in [Annex 6](#).

6.3 Implementation Plan

The next major step in the process is to take the SEA for the TSP forward towards actionable programmes. The recommendations and associated alternatives provided in this report will need further deliberation by the relevant stakeholders at various levels, so that an appropriate implementation plan can be crafted and finalised.

To this end, a preliminary framework is provided in the next pages to help take the process forward. It should be noted that this is only a suggested, zero draft, and the basic

information currently contained in it will require fine-tuning as the rest of the details are discussed and worked out over the course of upcoming consultations.

Implementation and Monitoring Framework (Action Plan) for the Strategic Environmental Assessment of the Thimphu Structure Plan

Scenario	Topic	Output	Indicator	Baseline	Target	Timeline		Lead Agency	Collaborating Agencies	Fund Committed/uncommitted	Implementation status	Remarks
						Start date	End date					
<i>Scenario 1: Population of 160,000</i>	Water	Water supply safely managed	Water supply masterplan for Thimphu Thromde developed									
			Water supply master plan implemented									
			Water network and water distribution system strengthened									
			Diagnostic study on optimisation of existing water distribution schemes conducted									
			Distribution of 24X7 equitable water supply									
			Monitoring system for water distribution and network system institutionalised									
			100% metering in all households implemented									
			Water tariff revised									
			Awareness raising with public on water saving devices									
			WTP, reservoirs, network rehabilitated									
			PPP for O&M of water supply explored/decided/instituted									
			Watershed management	Detailed study conducted on preservation & conservation of water sources and catchment areas								
				Detailed study conducted on PES for integrated water resource management								
				Integrated watershed management plans developed, including scoping studies on drying water sources					Watershed Management Division, MoAF			

REFERENCES

1. Gross National Happiness Commission. *Guidelines for Preparation of the 12th Five Year Plan*. RGOB. 2017.
2. Ministry of Works and Human Settlement. *Bhutan National Urbanization Strategy*. Royal Government of Bhutan, 2008.
3. Ministry of Works and Human Settlement and National Environment Commission. *Scoping Report for Undertaking a Strategic Environmental Assessment (SEA) of the Thimphu Structure Plan*. Prepared by Professor Barry Dalal-Clayton, Environment and Development Services, UK. December 2016.

ANNEXURES

Annex 1: Overview of Influence Area Dzongkhags

Paro Dzongkhag

Paro is situated in the north-western part of the country with a total area of 1285.5 square km. To its west lies Thimphu Dzongkhag, to its east Haa Dzongkhag, and to its South Chhukha Dzongkhag.

The wide fertile valley of Paro lies at an elevation of 7,000 feet with about 65.2 percent of its total area under forest cover. Paro is well known for paddy cultivation besides other crops and Thimphu is one of the main markets for its surplus products. Part of Jigme Dorji National Park (JDNP) lies in Paro and Biological Corridor 1 connect it to Jigme Khesar Strict Nature Reserve in Haa Dzongkhag. There are four main passes (outlet and inlets) - Jelela pass to Thimphu, Chelela to Haa, and Chhuzom to Thimphu, Haa and Chhukha. Chelela is also known for logging and supplies timber to neighbouring dzongkhags like Chhukha, Thimphu and Haa.

Pa Chhu flows through Paro valley and joins the Wang Chhu which flows from Thimphu, and these two rives generate hydroelectric power at Chhukha and Tala.

Paro has many government offices, schools, institutions, hotels and residential houses. It is a rapidly growing settlement and is one of the hubs for developmental activities, as well as the religious pivot in the country. The presence of the famous Kichu Lhakhang built by Gyalpo Srongtsen Gonpo, Taktshang Pelphug built by Desi Tenzin Rabgye, Drukgyel Dzong built by Zhabdrung Ngawang Namgyel, and many more historic sites in the valley has made Paro one of the top tourist destinations. Of the four airports in the country, Paro airport is the sole international airport. It is the closest district to Thimphu and is connected by good motorable road spanning over 54 km.

Punakha Dzongkhag

Punakha is situated in western Bhutan with an area of 1109.81 square km, bordered by Gasa to the north, Thimphu to the west, and Wangduephodrang to the east and south. It is located at an altitude of 1100-2500 metres above sea level and is a 71 km drive from Thimphu. Having been the winter capital of Bhutan until 1955, it currently serves as the winter residence for the Central Monastic Body.

About 75.87 percent of the *dzongkhag's* total land areas is under forest cover. Two *gewog* of Punakha fall under Biological Corridor, which connects JDNP in the north to Jigme Singye Wangchuck National Park (JSWNP) in Central Bhutan.

The *dzongkhag* is well known for rice, vegetables and fruits owing to its favourable location, soil and climatic conditions. Thimphu Throm is its major market and many people from Punakha commute to the city to sell their surplus every weekend.

It is also a popular tourist destination. Punakha Dzong is a major attraction besides Talo Dzong, Chhimi lhakhang, Khamsum Yulay Namgyel Chorten, and the two hot springs i.e. Koma tshachu and the Chhubu tshachu. The widening of the road between Thimphu and Punakha to a double lane has reduced the driving distance to less than two and a half hours.

Wangduephodrang Dzongkhag

Wangduephodrang is one of the largest dzongkhags in the country with an area of 4029.03 square km and ranges from 800-5800 metres in altitude. It has extremely varied climatic conditions ranging from subtropical forests in the south to cool and snowy regions in the north.

Most of parts of the *dzongkhag* is environmentally protected and about 73 percent of it is under forest cover. The northern half of the district falls within the Wangchuck Centennial Park (WCP), with north-western pockets belonging to JDNP. South-eastern Wangdue is part of JSWNP. Also protected are Biological corridor 8 that connect WCP and JDNP in the north to JSWNP in central Bhutan.

Phobjikha valley is one of the most notable sites in the district. This valley is the habitat of the rare and endangered black necked cranes that roost there during their annual migrations. Hence, the valley attracts lots of tourist to the district.

With its diverse climates and rich natural resources, Wangduephodrang Dzongkhag is home to many rare and exotic animals like red pandas, tigers and leopards. There are also large numbers of rare birds such as the White-Bellied Heron and the Spotted Eagle, besides the black necked crane.

Paddy is an important crop and paddy fields are mostly located along the Dang chhu and Punatsang Chhu where two crops of rice are grown annually. Potato is an important cash crop for the *Gewogs* of Phobji, Gangtey and Sephu. The country's largest hydroelectric project is located in Wangduephodrang along the Punatsang Chhu basin. Construction materials such as sands, stones and timber are supplied from Wangdue to the neighbouring dzongkhags of Paro, Punakha and Thimphu.

Annex 2: Relevance of national PPPs and international agreements to the TSP

National Legislations, Policies, Plans, Strategies and Guidelines Relevant to TSP

	Legislation/ Policy	Relevancy	Narratives
	Bhutan 2020	Strong (National)	Outlines the country's development goals, objectives and targets with a twenty- year perspective to maximise Gross National Happiness (GNH). Even before the inception of the SDGs, Vision 2020 enunciated Bhutan's development pursuits to be carried out within the limits of environmental sustainability and without impairing the ecological productivity and natural diversity, providing the policy context for sustainable development - implicitly encompassing a path that is resilient to and mitigates climate change.
	Constitution of the Kingdom of Bhutan (2008)	Strong (National)	Decrees that the country maintain a minimum of 60 percent of the total land under forest cover for all times to come. The government is decreed to conserve and improve the environment and safeguard the country's biodiversity.
	National Environment Protection Act (NEPA) 2007	Strong (National)	NEPA establishes the legal requirement to ensure that development pursuits should take place within the limit of environmental sustainability. The Act has been enacted to protect and promote a safe and healthy environment; prevent, control and abate environmental harm, including pollution; ensure conservation and sustainable use of natural resources; and institutionalise the environmental assessment process as an integral part of the development planning process through implementation of the Environmental Assessment Act, 2000. It calls for conservation of natural resources to be based on a participatory approach aimed at achieving an equitable sharing of the costs and benefits of conservation among resources users.
	Environmental Assessment Act (EA Act) 2000	Strong (National)	The Act stipulates the requirements for conducting environmental assessments and obtaining environmental clearances for development projects. It gives all Bhutanese a fundamental right to a safe and healthy environment with equal and corresponding duty to protect and promote the environmental wellbeing of the country. It directs the government to ensure that environmental concerns are taken into account when formulating, renewing, modifying and implementing any policy, plan or programme. It requires the issuance of environmental clearance as a prerequisite to the approval of any development activity. The EA Act (2000) establishes procedures for the assessment of the potential effects of strategic plans, policies, programmes [implying both SEA] and projects [implying EIA] on the environment, and for the determination of policies and measures to reduce potential adverse effects and promote environmental benefits.
5	Regulation for the Environmental Clearance of Projects (2002 and revised 2016)	Strong (National)	This Regulation ensures environmental concerns are fully taken into account when formulating, renewing, modifying and implementing any policy, or programme, as per regulations. The issuance of an environmental clearance from Designated Competent Authorities shall be prerequisite to the issuance of development consent. The environmental clearance shall set out

			environmental terms for the project. When a development consent is required, the environmental clearance shall be attached to and be an integral part of it.
	Regulation on Strategic Environmental Assessment, 2002	Strong (National)	Establishes procedures for the assessment of the potential effects of strategic plans, policies, programmes [implying SEA] on the environment, and for the determination of policies and measures to reduce potential adverse effects and promote environmental benefits.
7	Guideline for Preparation of 12th Five Year Plan, 2016	Strong (National)	<p>The 12th FYP seeks to operationalise GNH by adopting the nine domains. The 16 National Key Results Areas (NKRAs) are the highest priority outcomes identified by the government to be achieved by the end of the Plan.</p> <p>The TSPs objectives are largely attuned to the 12th FYP NKRAs i.e. NKRA 3, Poverty and Inequality Reduced; NKRA 4, Culture and Tradition Preserved and Promoted; NKRA 5, Healthy Ecosystem Services; NKRA6; Carbon Neutral, Climate and Disaster Resilient Development Enhanced; NKRA 9, Efficiency and Effectiveness of Public Services Improved; NKRA 10, Gender Equality Promoted, Women and Girls Empowered; NKRA 11, Productive and Gainful Employment Created; NKRA 1, Corruption Reduced; NKRA 13 Democracy and Decentralization Strengthened; NKRA 14, Healthy and Caring Society Enhanced; and NKRA 15, Liveability, Safety and Sustainability of Human Settlements Improved.</p> <p>The review of the TSP PPPs and implementation of the recommendations thereof, as part of this SEA exercise will enable Thimphu Thromde to achieve the 12th FYP objective in particular, and help create conducive environment for people to pursue happiness in general.</p> <p>Specifically, NKRA 15, <i>“Liveability, Safety and Sustainability of Human Settlement Improved”</i>, encompasses most of the characteristics that are required to be covered under any sustainable plan of a city. Hence, all thromdes have to make progress on the various Key Performance Indicators (KPIs) outlined in this particular NKRA as well as others. The 12th FYP Guidelines identifies two NKRAs – NKRA 5 and NKRA 6 – related to the environment and conservation. NKRA 5 is about continuing to conserve Bhutan’s natural environment that provides many essential ecosystem services such as clean air and water, and natural resources required for development. NKRA 6 is about ensuring a carbon neutral development path and building capacity to respond, mitigate and adapt to climate change. It is also about building Bhutan’s resilience to disaster impacts.</p>
	Forest and Nature Conservation Act (1995) & Regulation (2017)	Strong (National)	Covers forest management, prohibitions and concessions in State Forests, forestry leases, social and community forestry, transport and trade of forestry produce, protected areas, wildlife conservation, soil and water conservation, and forest fire prevention. It also prohibits blocking, storing or diverting any

			river, stream, irrigation channel, waterfall, underground water source or any other water source or watercourse. The Act also prohibits disposing garbage or other waste material, and the polluting of any water source or watercourse. Further, the Act restricts felling of timber and extracting timber within 100 feet of the bank or edge of any river, stream, watercourse, or water source. FNCR 2017 covers watershed management and wet lands conservations.
9	Carbon Neutral Declaration (2009)	Strong (National)	Bhutan is committed to remaining Carbon Neutral at all times and taking urgent action to combat climate change by ensuring that the emissions of GHGs do not exceed the sequestration capacity of the country's forests. Bhutan committed to use soft power to mobilise resources for pursuing a development pathway that is in line with the overall development philosophy of GNH.
10	Forestry Policy 2010	Strong (National)	It serves as the guiding policy framework for forest management and nature conservation. It recognises the important role of sustainable forest management in climate change mitigation and adaptation. The policy adopts an integrated landscape-level approach to sustainable forest management.
11	The Land Act of the Kingdom of Bhutan 2007	Strong (National)	This Act regulates, manages and administrates the ownership and use of land for socio-economic development and well-being through an effective land administration. The land management has also been streamlined and decentralised to local authorities. The local authorities are empowered to resolve land disputes, endorse land transaction and conversion of land categories.
12	The Land Rules & Regulations of the Kingdom of Bhutan 2007	Strong (National)	It focusses more on rural areas. With regard to urban areas, it mandates institution of local level land committee to oversee land acquisition and compensation for land acquired for developmental purposes.
13	Rules and Regulations for Lease of Government Reserved Forest Land & Government Land 2009	Strong (National)	It details out procedures for leasing government reserve forests including government land for developmental purposes.
14	Land Compensation Rates -2017	Strong (National)	Revised land compensation rates prepared by Property Assessment and Valuation Agency.
15	Land Pooling Rules 2018	Strong (National)	In the spirit of ensuring better urban planning and development, and in line with the sustainable goals to promote equity by benefiting all stakeholders equally, Land Pooling Rules is commonly used as one of the planning techniques.

16	Thimphu Development Control Regulations (2016)	Strong (Local)	Development Control Regulations have been formulated as part of the Thimphu Structure Plan. It is a set of rules and procedures drawn from the overall development plan to support and facilitate realisation of the goals and objectives envisioned in the plans. The jurisdiction of these regulations includes the area within TSP.
13	Bhutan Architectural Guidelines (2014)	Strong (National)	In order to promote and preserve culture and heritage, taking into account the new dimensions of modern development.
	Building Colour Code (2014)	Medium (National)	The Building Colour Code had been formulated mainly to avoid the use of un-aesthetic multi colours in buildings, and also to preserve and promote Bhutanese architectural and cultural landscape.
17	Bhutan Water Policy, 2003	Strong (National)	Describes the approach and context of water resources management from a multi-sectorial perspective. The policy advocates integrated water resources management to address existing and emerging water issues including those arising from climate change. It identifies priorities of allocating water for drinking and sanitation, for food production, for hydropower development and for industrial purposes.
20	Bhutan National Urbanization Strategy (2008)	Strong (National)	Relevant to the TSP as urbanisation rate is the highest in Thimphu Thromde. The objective of BNUS is to <ul style="list-style-type: none"> • Develop a proactive approach to the country's urban growth in a sustainable and environmentally sound way that minimises the negative effects of urbanisation; • Ensure balanced regional growth; • Develop a strategy for improving the quality of life of the growing urban population in a way that embraces rather than undermines the local culture and values; • Develop a set of recommendations to improve local government systems in Bhutan, including municipal finance and institutional aspects.
21	Thimphu City Development Strategy (2008)	Strong (Local)	It is a review of the on-going implementation of the TSP and LAP. The recommendations made in this document are after the review of the TSP and is very important for the improvement and management of the Throm.
	Bhutan Building Rules, 2018	Strong (National)	The Bhutan Building Rules are applicable to any settlement across the country, in the absence of any development plan for that settlement in question. Its operation is thus imperative. In any case where Thimphu DCR has not mentioned the required regulations and procedure, BBR 2018 is to be referred.

22	Local Government Act (2009)	Strong (National)	The Thromde is governed by the LG Act. The LGA was formulated to support decentralised governance. It decentralises planning, management of implementation and Monitoring & Evaluation (M&E) to local governments namely the <i>Dzongkhags</i> , <i>Thromdes</i> and <i>Gewogs</i> exercised through the <i>Dzongkhag Tshogdus</i> and <i>Gewog Thogdes</i> respectively. In terms of environmental conservation, the Act empowers the local government with authority to regulate air, water and noise pollution; approve clearance as per RECOP 2016, prevent encroachment into forests, community and government lands; hold in custody community forests and land as well as medicinal herbs; and to protect and conserve water sources and bodies.
25	Waste Prevention and Management Act 2009 and Rules	Strong (National)	The purpose of the Act is to protect and sustain human health through protection of the environment by: a) reducing the generation of waste at source; b) promoting the segregation, reuse and recycling of wastes; c) disposal of waste in an environmentally sound manner; and d) effective functioning and coordination among implementing agencies. It requires all development activities that generate waste to be planned and executed in harmony and within the carrying capacity of the country's fragile ecological settings. The Act states that a person polluting the environment or causing ecological harm shall be responsible for the costs of avoidance, containment, abatement, medical compensation, mitigation, remediation and restoration.
26	Guidelines for Planning and Development of Human Settlements in Urban and Rural Areas of Bhutan to minimise environmental impacts, 2013	Strong (National)	The document presents a guiding framework for the development of human settlements by mainstreaming environment, climate change and poverty. The recommendations are based on eco-friendly technologies, conservation, and resilience against environmental hazards.
27	Bhutan Green Buildings Guidelines (2013)	Strong (National)	The Guidelines have been developed to compliment regulations, standards and projects to minimise negative impacts of buildings and encourage practices for green and sustainable construction.
28	Water Act (2011)	Strong (National)	It establishes water resources as a state property and ensures that it is protected, conserved and/or managed in an economically efficient, socially equitable and environmentally sustainable manner. Water management will be organised on an integrated river basin level to achieve economic efficiency, social equity and environmental sustainability.

29	National Strategy for Integrated Solid Waste Management (2014)	Strong (National)	Bhutan wants to attain Zero Waste through maximising resource recovery in the long run by applying a 4 Rs strategy (reduce at source, reuse, recycle, and responsibility). Citizens are to participate in waste segregation and resource conservation to achieve maximum processing and land fill diversion. Public Private Partnerships are to serve as key vehicles for waste management. Extended Producers' Responsibility for all non-recyclable products is to be introduced.
30	Bhutan Water Vision 2025 (NEC)	Strong (National)	It emphasises water resources management within river basins and aquifers, including both upstream and downstream water users. It assigns the NEC to prepare and continuously update the National Integrated Water Resources Management Plan for conservation, development and management of water resources. The plan shall be mainstreamed into National Policies, Plans and Programs. It also requires establishment of River Basin Committees within a basin for the purpose of proper management of water resources and to prepare River Basin Management Plans.
31	National Strategy and Action Plan for Low Carbon Development, 2012	Strong (National)	It was primarily prepared in support of Bhutan's commitment to remain carbon neutral development at the 15 th Conference of Parties of the UNFCCC in Copenhagen in December 2009. It presents a long-term national strategy comprising of various scenarios analysing development paths from 2005 until 2040. Concomitant to these scenarios, the action plan articulates a number of short and medium- term interventions under various development sectors to achieve sustainable economic growth through green and low-carbon growth.
32	Nationally Determined Contribution (NDC), 2017:	Strong (National)	Bhutan reiterated its commitment to remain carbon-neutral and to undertake mitigation actions between 2020 and 2030, conditional on the provision of international support. Key mitigation areas include green buildings and smart cities, low carbon transport and sustainable waste management.
33	Bhutan Green Transport and Electric Vehicle Initiative (EVI), 2014	Strong (National)	Policy to promote electric vehicles as part of RGoB's efforts to curb the dependency on fossil fuels and simultaneously address environmental issues by imposing heavy tariffs on conventional vehicles, which are the major consumers of petroleum (DRE 2016). Shift from use of fossil fuel to clean hydropower-generated electricity is encouraged through implementation of tax exemption on electric vehicles.
34	Water Regulation of Bhutan 2014, NEC	Strong (National)	The regulation enforces the objectives and purpose of the Water Act, and identifies the roles and responsibilities of designated competent authorities and other relevant organisations.
35	Bhutan Drinking Water Quality Standards 2016	Strong (National)	Drinking Water Quality Standard is in line with WHO standards, to ensure safe drinking water. Such standards protect public health by limiting the levels of contaminants in the drinking water.
	Waste Prevention and Management Rules and	Strong (National)	Roles and areas of implementation of the implementing agencies have been identified for the purpose of establishing a sound waste management system including monitoring procedures at

	Regulation 2016		every organisational level, through efficient collection, segregation, treatment, storage, transportation, reduction, reuse, recycling and safe disposal of solid, liquid and gaseous wastes.
39	Energy Efficiency (EE) Roadmap 2030, 2017	Strong (National)	A roadmap for EE measures to be implemented by various agencies to enhance productivity and implement the NDC. The roadmap is mainly focused on buildings, industries and appliances.
40	Low Emission Development Strategy for the Transport Sector, 2016	Strong (National)	It incorporates all existing transport-related plans, policies, initiatives, and actions in Bhutan to create a long-term, integrated and comprehensive transport strategy for the next three decades. The overall vision is “to provide the entire population with a safe, reliable, affordable, convenient, cost-effective and environment-friendly transport system in support of strategies for socio-economic development”.
41	Sustainable Development Goals (SDG)	Strong (National)	At the national level, there is a very high level of integration between the development philosophy of GNH and SDG. The implementation of the SDGs in Bhutan forms an integral part of process and input to all development activities of the TSP. The TSP is relevant to most of the SDG goals such as SDG 1: No Poverty, SDG 3: Good Health and Wellbeing, SDG 4: Quality Education, SDG 5: Gender Equality, SDG 6: Clean Water and Sanitation, SDG 7: Affordable and Clean Energy, SDG 8: Decent Work and Economic growth, SDG 9: Industry, Innovation and Infrastructure, SDG 10: Reduce Inequality, SDG 11: Sustainable Cities and Communities, SDG 12: Responsible Consumption and production, SDG 13: Climate Action, SDG 15: Life on Land, SDG 16: Peace, Justice and Strong Institutions, and SDG 17: Partnership.
42	National Sanitation and Hygiene Policy (DRAFTING)	Strong (National)	It aims to provide clear policy direction to the sanitation sector which is a critical sector with ever increasing demand for better infrastructure and services. This policy considers the institutional roles and responsibilities for sanitation and hygiene and builds on the existing sanitation sector encompassing all components with respect to technology, infrastructure, environment, health and economic development. This integrated policy explicitly addresses the significant opportunities to professionalise sanitation and hygiene service delivery, and reach universal coverage to reduce the incidence of disease and improve health, happiness and wellbeing for all in Bhutan.
43	National Transport Policy of Bhutan (Draft) 2017	Strong (National)	The policy provides a strategic transport direction towards improving access, reliability, affordability, safety, sustainability, economic efficiency, inclusiveness and overall socioeconomic development. Among others, the policy attempts to streamline the institutional arrangement, wherein the current transport mandates which is fragmented among many agencies is brought under one lead ministry. The draft policy has a dedicated chapter on urban transport.
43	National Housing	Strong	The policy is expected to incorporate principles of affordability,

	Policy (DRAFTING) 2018	(National)	accessibility, inclusiveness and sustainability in housing through rearrangement of institutional mechanism that is applicable to the current scenario by defining clear roles and responsibilities of the key players in the housing sector and addressing all the gaps and limitations of the existing policy.
	National Climate Change Policy (DRAFTING)	Strong (National)	The RGoB will take measures to maintain carbon neutral status of Bhutan, enhance and protect life, livelihoods and happiness of people of Bhutan. The policy will further ensure adequate measure for climate mitigation and adaptation actions.

44	National Human Settlement Policy 2018	Strong (National)	The policy seeks to promote a comprehensive and an integrated approach to settlements planning and development while ensuring: preservation of environment and conservation of the ecology; preservation of tradition, culture, historic structures and sacred sites; that human settlements are safe and resilient to disasters; and promoting equitable access and rational use of resources.
45	National Human Settlement Strategy 2017	Strong (National)	This strategy seeks to ensure integrated and regionally balanced development and establish a roadmap for the development of settlements, both in rural and urban areas, while considering environmental conservation and preservation of culture and decentralisation to promote participatory development. This document includes component-wise strategies and recommendations to address challenges identified in various sectors, including institutional linkage and coordination, settlement systems and planning, housing, disaster-mitigation measures, tourism, etc.
46	Low Emission Development Strategy (LEDS) for urban and rural settlement in Bhutan, 2017	Strong (National)	LEDS for Human Settlement guides Bhutan's endeavour to protect the environment and transition to sustainable low carbon development. This overarching LEDS on human settlements is intended to ensure that sectoral LEDS complement each other and align with Bhutan's low-carbon development actions. It focuses on mitigation potentials on three sectors: 1) Buildings - mainly energy for heating/cooling and cooking; 2) Transport - mainly passenger transportation; and 3) Waste - mainly municipal solid waste management. Mitigation measures do not only result in a reduction of GHG emissions but often contribute to sustainable development, referred to as co-benefits. The LEDS also address risks, vulnerabilities and uncertainties associated with global climate change and the pressing development needs countries face as they pursue sustainable development.
47	Bhutan Transport 2040: Integrated Strategic Vision 2013	Strong (National)	This long-term strategic document seeks "to provide the entire population with a safe, reliable, affordable, convenient, cost-effective and environmentally friendly transport system in support of strategies for socio- economic development". The government has set out a total of nine transport strategies, namely, road network, civil aviation, inter-city passenger transport, freight transport, regional connectivity, urban transport, road safety, road transport regulation, and transport sector management.
48	Spatial Planning Bill	Strong (National)	It is critical that Bhutan's scarce resources are efficiently managed through a coordinated approach to land-use planning and development. The developments must be regulated appropriately to make best use of the available space for sustainable and liveable human settlement. Currently, the planning process and implementations are often challenged, and development control regulations are not fully adhered to, in the absence of legislation specific to spatial and human settlement

			planning. The bill aims to regulate plan preparation, implementation and administration; prescribe the levels and categories of plans, planning procedures and techniques; and also give legal effect to the development control regulations.
49	Comprehensive National Development Plan (DRAFTING)	Strong (National)	CNDP aims to promote a coordinated approach to development and promote well-balanced development in urban and rural areas across the country. It is the first attempt to envision a national spatial structure, concerning socioeconomic development and the sector strategies.
50	Incentives for Management of the Protected Zones within Thromde Boundary 2016	Strong (National)	Spatial planning involves designation of different land uses with controlled or no construction in some areas. Under the circumstances, it is perceived that immediate economic benefits are not accrued by all landowners equally. To address this, Incentives for Management of the Protected Zones within Thromde Boundary 2016 has been developed. The protected zones are categorized into environmentally sensitive areas; cultural landscape areas; and buffer areas. The protected zones are provided with incentives such as tax concessions and various types of subsidies.
51	Alternative Renewable Energy Policy, 2013	Medium (National)	The objective of this policy is to contribute to energy security and broaden the energy portfolio through utilisation of available renewable energy potential; reduce GHG emissions and contribute to climate change mitigation; promote green growth and enhance sustainable socioeconomic development.
52	Tenancy Act of Bhutan 2015	Medium (National)	Tenancy Act regulates the tenancy matters in the country. It guides the drafting of legally enforceable rental agreements between the parties and determines the rights and duties for both the tenant and owner. It spells out the procedures and forum for settling the tenancy disputes before court litigations.
53	Guidelines for Lease of GRF Land for Commercial Agriculture (2011)	Medium	
54	Cottage, small and medium industry policy 2012	Medium	Provides direction for development of CSM industries; prepares them for the opportunities and challenges of globalisation; ensures that they play an increasing role in fostering economic development; to generate employment & support equitable distribution of income and bring about balanced regional development.
55	Guidelines for Differently Abled Friendly Construction 2016	Medium (National)	The guideline will guide the engineers, architects, urban planners and developers to design and construct barrier-free infrastructure that will cater to the needs of the differently-abled people in the society.

56	Seismic Vulnerability Assessment Guideline for Load Bearing Structures 2017	Medium (National)	This will guide the engineers in the field and help assess the seismic vulnerability of load bearing structures.
57	Economic Development Policy 2016	Medium (National)	EDP promotes a “green and self-reliant economy”. It identifies number of areas of economic opportunities, based on unique selling points, with the aim of creating employment opportunities.
58	National Energy Efficiency and Conservation Policy (draft), 2016	Medium	The Policy aims at creating the framework to promote, govern and monitor energy efficiency and conservation activities. It also sets out energy saving targets in buildings, appliances, and industry and transport sectors.
59	Mineral Development Policy (2017)	Weak	The policy seeks to: develop the scarce mineral resources for optimum value addition so that maximum benefit accrues to the nation; allow selective and cautious development of minerals for socioeconomic development while ensuring environmental sustainability and inter-generational equity in the larger interest of the country; ensure the availability of construction materials at affordable prices to all the citizens; increasingly contribute to national economic development by enhancing generation of revenue and employment; promote human resource development and ensure that mineral development is carried out by technically qualified professionals; promote investment in the mineral sector by technically and financially competent entities; develop an integrated mineral information system in the country; and ensure effective regulation, administration, management and monitoring of the mineral sector.
60	Road Sector Master Plan, 2007-2027 (2006)	Weak	
61	Bhutan Rural Construction Rules (2013)	Weak	Thimphu Thromde is an urban area and hence, does not have to comply with the Bhutan Rural Construction Rules.
62	Bhutan Information, Communication and Media Act (2006) Rules on the Provision of ICT Facilities and ICT Services (2008)	Weak	Governs entertainment, media, entertainment

International Agreements and Protocols that are relevant to the TSP

	International Agreement/Protocol	Relevancy	Narratives
1	UN Framework Convention on Climate Change (UNFCCC, 1992):	Strong (National)	The United Nations Framework Convention on Climate Change sets an overall framework for inter-governmental efforts to tackle the challenge posed by climate change. Under the Convention, governments gather and share information on greenhouse gas emissions, national policies and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.
2	The Kyoto Protocol to the UNFCCC (ratified in 2005)	Strong (National)	Since the UNFCCC did not have measurable or binding targets for emission reductions, the Kyoto Protocol was adopted in 1997 as a way to set up “measurable, reportable and verifiable” reductions by Annex I countries. This is in keeping with the principles of the CBDR where Annex I countries would take the first step. The aim is for annex I countries to reduce emissions collectively by five percent below 1990 levels during the five-year period of 2008-2012 (first commitment period). In addition to requiring domestic measures, the Protocol also sets up three flexible mechanisms (including the Clean Development Mechanism) to help Annex I countries meet their targets. The rules of implementation of the Kyoto Protocol were adopted at COP7 in 2001 as the Marrakesh Accords. The Kyoto Protocol entered into force in 2005 following a “double trigger” of ratification by at least 55 parties, and also with developed country parties accounting for 55 percent of the groups’ 1990 emissions. Bhutan was signatory to the Kyoto Protocol in 1997 and became party to the protocol after submitting the instrument of Ascension on 26 th August 2002. The second commitment period of the Kyoto Protocol was agreed on at the Doha Climate Change Conference in December 2012
3	Paris Agreement 2015	Strong (National)	At COP 21 in Paris, Parties to the UNFCCC reached a historic agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. The Paris Agreement requires all Parties to put forward their best efforts through “nationally determined contributions” (NDCs) and to strengthen these efforts in the years ahead. This Agreement, includes: a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change; (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does

			not threaten food production; and c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.
4	Paris Agreement to the UNFCCC (ratified September 22, 2017)	Strong (National)	<p>The Agreement establishes a dynamic and progressive system of five-year cycles of action through a bottom up approach where countries put forth their nationally determined actions for mitigation and adaptation.</p> <p>1) Articles 4, 5 and 6 cover mitigation. Under Article 4 Parties will prepare, communicate and maintain nationally determined contributions (NDC) on mitigation for domestic actions to reduce or control growth in GHG emissions in line with national circumstances and abilities. NDCs will be effective from 2020 and will be prepared every five years with each successive NDC being progressive and an improvement on previous actions. Article 5 is specifically on sinks for GHGs and includes the mechanisms for forest sink management through the REDD+ mechanism. Article 6 establishes a mechanism for sustainable development that mirrors the clean development mechanism and emissions trading mechanisms of the Kyoto Protocol, and also defines a new a framework for non-market approaches to sustainable development.</p> <p>2) Parties will address the adverse impacts of climate change through adaptation as set out in Article 7. The goal of adaptation is to enhance adaptive capacity strengthening resilience and reducing vulnerability to climate change through national adaptation planning and implementation of required actions. The needs and priorities for adaptation are to be conveyed in Adaptation Communications which can be in the form of a National Adaptation Plan (NAP), part of an NDC, or as part of the National Communications.</p>
6.4	6.5 UN Framework Convention on Climate Change (UNFCC) (acceded 1995)	6.6 Strong (National)	6.7 To achieve the main objective of the Convention, Bhutan must work collectively with other countries to reduce, or mitigate, greenhouse gas (GHG) emissions. To do so, countries require accurate information of GHG sources and sinks, emissions trends, and the methods and technologies available to shift our societies and economies onto a path of sustainable development. Consequently, Bhutan needs to design and implement actions that will mitigate GHGs and effectively adapt to the impacts of climate change.
6	Malé Declaration on Control and Prevention of Air Pollution and its likely transboundary effects for South Asia:	Strong (National)	It is the only existing regional mechanism to handle transboundary air pollution in the region and was adopted by environment ministers of South Asia under the auspices of the South Asia Co-operative Environment Programme (SACEP). Until recently the activities for this issue was funded by the Swedish government through the UN Environment Programme (UNEP). Presently, member countries are discussing how to strengthen the declaration. In 1998, UNEP together and Stockholm Environment Institute (SEI) drew attention to impacts of transboundary air pollution in South Asia. This initiative led to the adoption of the Malé Declaration on Control and Prevention

			of Air Pollution and Its Likely Transboundary Effects for South Asia (Malé Declaration). Participating Countries are Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan and Sri Lanka. Implementation is coordinated by the UNEP Regional Resource Centre for Asia and the Pacific (RRC-AP) and the SACEP in collaboration with the national governments from the eight participating countries.
7	Rio Declaration on Environment and Development (1992):	Medium (National)	It includes the pollution and polluter pay principle; resource extraction (e.g. construction activities, water extraction, waste generation etc.); sustainable development; resource management; poverty reduction; environmental protection; pollution; transboundary environmental management; transfer of hazardous substances; internalisation of environmental costs; sustainable livelihoods; indigenous peoples; and gender and youth inclusiveness
8	Ramsar Convention on Wetlands, 1971	Medium (National)	As a result of development, wetlands are deteriorating. There is a need for wetland management plan within the TSP. While the RSP does not have any project under RAMSAR sites, the areas of influence (such as the Phobjekha-Wangduephodrang site) is included. The objective is to stem the progressive encroachment on and loss of wetlands, recognising their fundamental ecological functions and economic, cultural, scientific, and recreational value. It is the only global MEA that deals with a particular ecosystem. The Paris Protocol (1982) and the Regina Amendments (1987) are procedural and do not affect substantive principles.
9	United Nations Conference on Housing and Sustainable Urban Development, October 2016	Medium (National)	Related to Housing and urban development
10	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (acceded 2004)	Medium	Related to hazardous waste (municipal, e-waste, medical, pesticides, fertilizers etc.). The Basel Convention is an international treaty designed to reduce the movements of hazardous waste between nations and, more importantly, to prevent the transfer of hazardous waste from developed to less developed countries. The Convention's other purpose is to minimise the amount and toxicity of wastes generated, and to ensure that management is carried out close to the source of generation and is environmentally sound.
11	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	Medium (National)	Includes the use of lead in paint, automobiles, mercury, arsenic and other chemicals that are used for construction and medical purposes, etc.

	(1998).		
12	UN Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD, 1994):	Medium (National)	TSP has to deal with land-use change and land degradation. The Convention calls for action involving international cooperation and a partnership approach. It focuses on improving land productivity, rehabilitation of land, conservation, and sustainable management of land and water resources. Such actions are intended to prevent the long-term consequences of desertification, including mass migration, species loss, climate change, and the need for emergency assistance to populations in crisis.
13	UNESCO World Heritage Convention ratified the Convention on 22 October, 2001	Medium	TSP includes cultural heritage assets, biodiversity spots and scenic landscape. The Convention requires parties to ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory for future generations. Cultural heritage includes monuments, buildings and sites. Natural heritage includes natural features and formations which are of outstanding aesthetic or scientific value, geological and physiographical formations, and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation; and natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.
16	Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES,1973).	Weak	The trade in endangered species of wild Fauna and Flora are strictly prohibited.
17	Bonn Convention on the Conservation of Migratory Species of Wild Animals (1979	Weak	In terms of Thimphu Thromde, this has weak relevance but it is still relevant in the areas of influence like Punatsang Chhu and Phobjekha.
18	Vienna Convention on Protection of the Ozone layer (1985) and the Montreal Protocol on Substances that Deplete the Ozone Layer (1987).	Weak	
19	Espoo Convention on Environmental Impact Assessment in a Trans boundary Context (1991).	Weak	Most plans and projects under Thimphu Thromde require EIA for issuance of environmental clearance. However, since TSP is defined by the Thimphu Thromde's boundary, EIA in a transboundary context is not required.

20	UN Convention on Biological Diversity (CBD, 1992):	Weak	
21	International Plant Protection Convention, 1994.	Weak	
22	UN Convention on Biological Diversity	Weak	To conserve biodiversity; sustainable use of biodiversity; habitat protection; protect biodiversity resources from development activities.
23	Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (1998).	Weak	Environmental justice, public consultations and awareness
24	Stockholm Convention on Persistent Organic Pollutants (2001).	Weak	
25	UN International Forest Policy (2007).	Weak	Forest land encroachment, land-use change, timber harvesting
26	Protocol on Strategic Environmental Assessment (to the Espoo Convention) (2003, Kiev). Entered	Weak	
27	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), acceded to on 15 August, 2002.	Weak	No direct relation to trading of endangered species in the TSP. CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.
28	Cartagena Protocol on Biosafety to the Convention on Biological Diversity (acceded 2002)	Weak	Food and organic farming which is related to organic urban farming practices
29	UN Convention to Combat Desertification (acceded 2004)	Weak	Land degradation as a result of urbanisation.

30	Vienna Convention for the Protection of the Ozone Layer (acceded 2004)	Weak	The Vienna Convention establishes a framework for international cooperation aimed at the development of policies and the formulation of suitable measures to protect human health and the environment against adverse effects resulting or likely to result from human activities, which modify or are likely to modify the ozone layer. Specific obligations relating to the control and elimination of ozone-depleting substances (ODS) are contained in the Montreal Protocol on Substances that Deplete the Ozone Layer.
31	Montreal Protocol on Substances that Deplete the Ozone Layer (acceded 2004)	Weak	This Protocol to the Vienna Convention for the Protection of the Ozone Layer is an international treaty designed to protect the ozone layer through the phasing out of production of substances identified as the likely causative agents of ozone depletion. The principal causative agents are halogenated hydrocarbons containing either chlorine or bromine.
32	Nagoya Protocol on Access and Benefit-sharing on 20th September, 2011	Weak	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity is a supplementary agreement to the Convention on Biological Diversity. It provides a transparent legal framework for the effective implementation of one of the three objectives of the Convention on Biological Diversity: the fair and equitable sharing of benefits arising out of the utilisation of genetics.
33	UN Convention on the Law of Sea	Weak	Bhutan is a landlocked country.

Annex 3: Matrix of TSP principles, GNH domains, 12 FYP NKRA, and SDGs

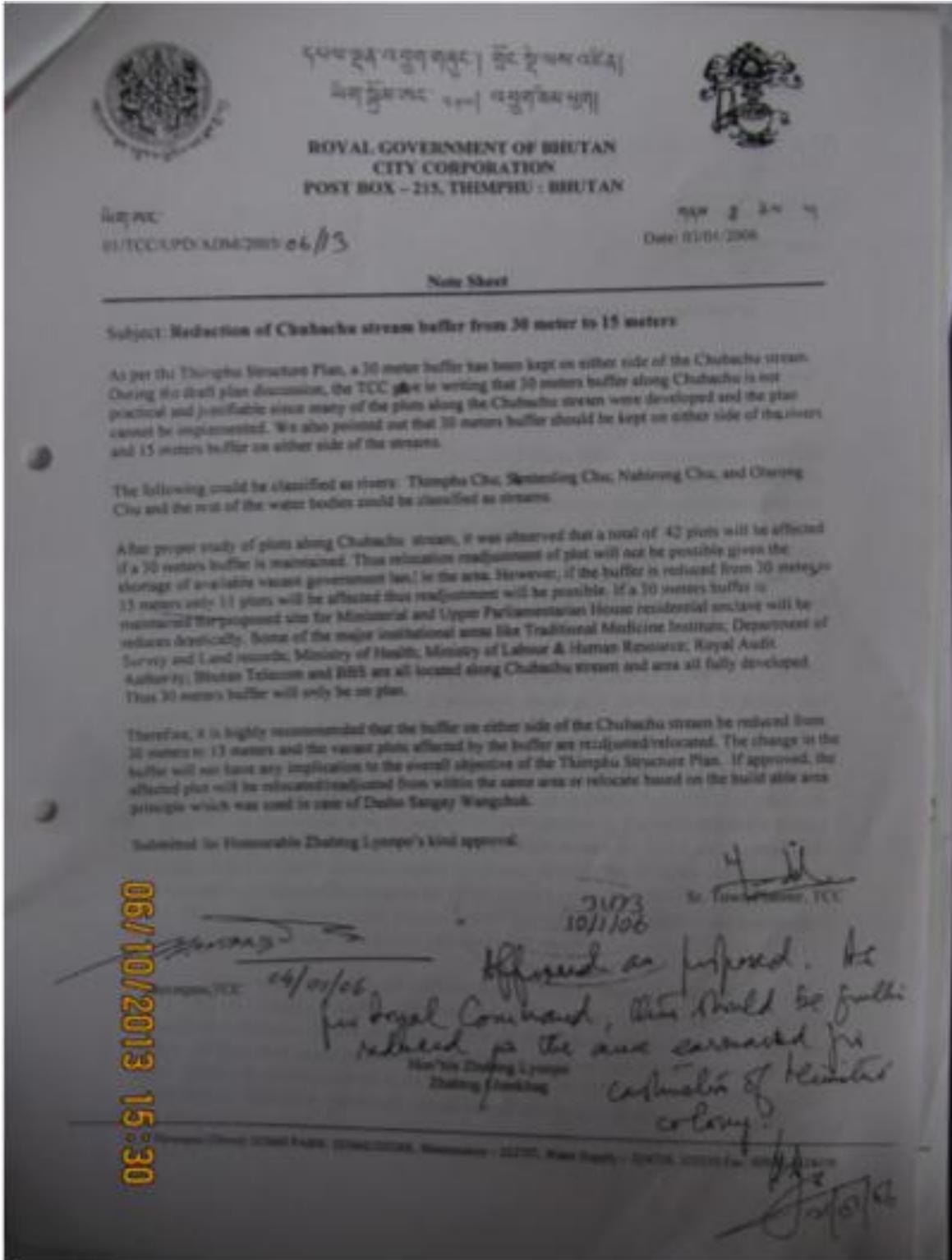
	TSP Principles	GNH Domains	NKRA	SDG
1	Balance with Nature	Ecological diversity & resilience	Healthy Ecosystem Services Maintained Carbon Neutral, Climate and Disaster Resilient Development Enhanced Water, Food and Nutrition Security Ensured	Affordable and clean energy Climate Action Life below water Life on land Clean water and sanitation Affordable and clean energy Partnership for the goals
2	Balance with tradition	Cultural diversity Community Vitality	Culture and Traditions preserved and promoted	Partnership for the goals
3	Conviviality	Cultural diversity Community Vitality Time use	Culture & Traditions Preserved & Promoted Healthy and Caring Society Enhanced Healthy Ecosystem Services Maintained Infrastructure, Communication and Public Service Delivery Improved Liveability, Safety and Sustainability of Human Settlements Improved	Sustainable cities and communities Gender Equality Peace, justice and strong institution Partnership for the goals
4	Human Scale (promotion of people friendly places, pedestrainization,	Living standard Health Time use Psychological wellbeing Cultural diversity Community Vitality	Infrastructure, Communication and Public Service Delivery Improved Livability, Safety and Sustainability of Human Settlements Improved	Good health and well being Reduce inequalities Sustainable cities and communities Partnership for the goals

5	<p>Opportunity Matrix</p> <p>(engine of economic activity, health care, services, facilities,</p>	<p>Education</p> <p>Health</p> <p>Living standard</p> <p>Time use</p>	<p>Economic Diversity and Productivity Enhanced</p> <p>Productive and Gainful Employment Created</p> <p>Poverty Eradicated and Inequality Reduced</p> <p>Justice Services and Institutions Strengthened</p>	<p>Gender Equality</p> <p>Clean water and sanitation</p> <p>Affordable and clean energy</p> <p>Decent work and economic growth</p> <p>Industry innovation and infrastructure</p> <p>Sustainable cities and communities</p> <p>Reduce inequalities</p> <p>Climate change</p> <p>Partnership for the goals</p>
6	<p>Efficiency</p> <p>(performance in services and facilities in an efficient manner...transport)</p> <p>Ecology, cost, pollution, health, promotes recreational facilities</p>	<p>Time use</p> <p>Good Governance</p> <p>Community vitality</p> <p>Ecological diversity and resilience</p>	<p>Infrastructure, Communication and Public Service Delivery Improved</p> <p>Economic Diversity and Productivity Enhanced</p> <p>Corruption Reduced</p>	<p>Clean water and sanitation</p> <p>Affordable and clean energy</p> <p>Industry innovation and infrastructure</p> <p>Sustainable cities and communities</p> <p>Responsible consumption and production</p> <p>Climate Action</p> <p>Partnership for the goals</p>
7	<p>Regional Integration</p> <p>Influence over immediate surroundings</p> <p>Need to recognise the wholeness of the city...area of influence</p>	<p>Cultural diversity</p> <p>Good Governance</p> <p>Community vitality</p>	<p>Culture and Traditions Preserved and Promoted</p> <p>Water, Food and Nutrition Security Ensured</p> <p>Infrastructure, Communication and Public Service Delivery Improved</p> <p>Healthy Ecosystem Services Maintained</p> <p>Productive and Gainful Employment Created</p>	<p>No Poverty</p> <p>Decent work and economy growth</p> <p>Quality Education</p> <p>Clean water and sanitation</p> <p>Decent work and economic growth</p> <p>Reduce inequalities</p> <p>Partnership for the goals</p>

8	<p>Balanced Movement</p> <p>Transport – transit – pedestria the South Asia Co-operative Environment Programme (SACEP) energy...</p>	<p>Living standard</p> <p>Ecological diversity and resilience</p> <p>Health</p> <p>Good Governance</p>	<p>Infrastructure, Communication and Public Service Delivery Improved</p> <p>Liveability, Safety and Sustainability of Human Settlements Improved</p>	<p>Industry innovation and infrastructure</p> <p>Sustainable cities and communities</p> <p>Partnership for the goals</p>
9	<p>Institutional</p>	<p>Good governance</p>	<p>Corruption Reduced</p> <p>Democracy and Decentralisation Strengthened</p> <p>Justice Services and Institutions Strengthened</p>	<p>Peace, justice and strong institutions</p> <p>Partnership for the</p>

Annex 4: Government directive

2006 Government directive to reduce buffer areas along the streams



Annex 5: Communication and stakeholder consultation plan for the SEA process

A communication plan with the following objectives is to be implemented as part of the process of the SEA for the TSP:

- Build awareness of the TSP and the objectives of the SEA
- Secure the ownership/commitment and inputs of Thimphu residents into the SEA exercise
- Influence specific policies and policymakers to promote the TSP and the SEA recommendations
- Encourage other stakeholders to participate as beneficiaries and partners

Consultation plan/system:

- Actively undertake communications on the project, including social media content development, working out loud, and reaching out to relevant technical forums
- Develop information for use in the Thromde and Ministry forums, and seek guidance from technical advisers and experiences in relevant fields
- Develop communications materials on the project (printed materials; and guide the development of any audio-visual material as may be required)

Facilitation of the community sessions and longer-term monitoring and evaluation:

- During the initial SEA process, design and facilitate community sessions in order to gather inputs on critical issues and recommendations
- Develop a long-term monitoring plan for the implementation of the TSP, including accountability etc. The monitoring plan should emanate from the consultations with stakeholders and communities and include information on the participation of women and vulnerable groups.

A communication mix of the following is to be implemented:

1. A Facebook and Twitter page will be started and administered by the IT persons in the Thromde and Ministry to receive comments, feedback etc. from a broader spectrum of stakeholders.
2. A link to receive feedback on the TSP will also be inserted into the websites of the MoWHS, Thimphu Thromde, etc. The public and anyone with interest will have access to leave their comments, feedback, concerns etc. Relevant organisations and civil society could also be requested to host such a spot.
3. A panel discussion to be organised on Bhutan Broadcasting Services. The discussion could include members of the public, core group members, *Thromde* officials, etc. The forum would be a good avenue to not only educate and create awareness of the TSP but also seek inputs from various groups.
4. A supplement on the TSP SEA could be inserted in a Saturday edition of the *Kuensel*. This would describe the objectives of the SEA exercise, give a background of the TSP, and solicit opinions, comments and feedback from the public.
5. Budget permitting, a short film to educate the general public on the TSP might be useful. The film will be used to mainly showcase the visions of the TSP and highlight some of the

constraints related to its implementation. The intention of the film is to educate residents about the larger objectives and visions of the plan, rather than looking at micro level issues and concerns. It will be based on interviews with TSP planners, implementers, Thromde officials, private citizens etc. A separate budget for this may be required as the cost will be high.

6. Community Consultations are a must to involve a diverse array of stakeholders, especially the general public, in the SEA exercise. Education, public awareness and soliciting inputs into the SEA will be the main objective of these consultations.

Topics to discuss:

1. Introduction to TSP
2. Implementations status of TSP
3. Objectives of the SEA for TSP
4. How community members can be involved in monitoring the TSP implementation in future
5. What are some of the concerns/issues with the TSP?
6. What recommendations would you like to see so that the original visions of the TSP can be achieved?

The following public forums/workshops are proposed to seek inputs from relevant stakeholders:

Workshop for Key Stakeholders:

1. One-day (two times) workshop with stakeholders identified as having High and Medium Impact and Influence on the TSP (Government institutions).
2. One-day workshop with civil society, private sector, industries and national public-sector enterprises.
3. 3 one-day workshops with the public and public representatives of Upper Thimphu, Middle Thimphu and South Thimphu.
4. Field trip to Punakha, Wangdue and Paro Dzongkhags to meet *Thromde* and *Gewog* Officials

Annex 6: Stakeholder and public consultations

(a) List of invitees to the stakeholder meetings

Ministry of Agriculture

Department of Forests and Park Services

Water Shed Management Division

Policy and Planning Division

Ministry of Home and Cultural Affairs

Department of Culture

Department of Disaster Management

Ministry of Economic Affairs

Policy and Planning Division

Department of Industry

Department of Cottage and Small Industries

Department of Trade

Ministry of Health

Department of Public Health

Department of Medical Services

Ministry of Information and Communication

Road Safety and Transport Authority

Policy and Planning Division

Ministry of Works and Human Settlement

Department of Human Settlement

Department of Engineering Services

Department of Roads

Policy and Planning Division

National Environment Commission

Environmental Services Division

Policy and Planning Section

Thimphu Thromde

Urban Planning Division

Infrastructure Division

Environment and Developmental Division

Gross National Happiness Commission

National Land Commission Secretariat, Urban land Management Division

Tourism Council of Bhutan

Association of Bhutanese Industries

Construction Association of Bhutan

Loden Foundation

Wood Based Industry Association

Association of Bhutan Tour Operators

Hotel and Restaurant Association of Bhutan

Automobile Workshop Association

Druk Holdings Investment

Natural Resources Development Construction Limited

Ability Bhutan Society

Dratshang Lhentshog

Bhutan Chamber of Commerce and Industry

Bhutan Association of Women Entrepreneurship

Tashi Cell

Bhutan Telecom Limited

RENEW

Royal Society of Protection of Nature

Clean Bhutan

Greener Way

Clean City

(b) List of invitees who attended

Strategic Environment Assessment for Thimphu Structure Plan

Public Consultation Meeting MoWHS

January 23, 2018, 2018 (10:00AM- 4:00PM) Dechencholing Higher Secondary School, Thimphu

Areas/Zone: Samteling, Pamtsho, Jungshina, Langjophakha, Taba and Dechencholing

	Name	Department
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1	Dasho Kinlay Dorji	Thrompoen, Thimphu Thromde
2	Ugyen	Dechencholing
3	Tenden Pasang	Dechencholing
4	Tandin	Dechencholing
5	Karma	Dechencholing
6	Nidup Lham	Dechencholing
7	Thuji Zangmo	Dechencholing
8	Kinzang Choden	Dechencholing
9	Wangdi Lham	Taba
10	Chimi Dema	Taba
11	Phuntsho Wangmo	Samtenling/Hejo
12	Noe-Noe	Hejo
13	Pamtsho Dophu	Pamtsho
14	Jemgeb Thumei	Jungep
15	Ugyen	Taba
16	Dechen Wangmo	Dechencholing
17	Tshering Wangmo	Dechencholing
18	Phuntsho Wangdi	Samteling
19	Kencho Wangmo	Taba
20	Yeshi Choden	Hejo/Samteling
21	Choden	Taba
22	Lhamo	Taba
23	Dawa Zangmo	Taba
24	Ugyen Dem	Taba
25	Lamcha	Taba
26	Wangchen Lhamo	Jungshina
27	Ugyen Pelmo	Dechencholing
28	Passang Wangdi	Hejo/Samteling
29	Karma Gyeltshen	Pamtsho
30	Dorji	Dechencholing
31	Rinchen Khandu	Dechencholing
32	Kelzang Dolkar	Samdrupling Taba
33	Tshering Yangdon	Taba
34	Karma Jimba	Taba/ Dechencholing
35	Pema Sithup	Dechencholing
36	Norbu Chogyel	Jungshina
37	Kinley Pem	Dechencholing
38	Yeshi Tshomo	Dechencholing
39	Choden	Dechencholing
40	Chencho	Dechencholing
41	Kunzang Lhamo	Dechencholing
42	Sonam Drukpa	Taba
43	Wangcha Sangay	Jungshina

44	Ugyen Tshering	Samteling
45	Sonam Peldon	PPD, MoWHS
46	Sonam Tshewang	Thimphu Thromde
47	Tshering Dendup	National Environment Commission
48	Sonam Desel	PPD, MoWHS
49	Dorji Wangmo	PPD, MoWHS
50	Thinley Norbu	Thimphu Thromde
51	Tshering Dorji	DHS, MoWHS

Strategic Environment Assessment for Thimphu Structure Plan

Public Consultation Meeting MoWHS

January 24, 2018, 2018 (10:00AM- 4:00PM) Changgangkha Middle Secondary School, Thimphu

Areas/Zone: Core area, Motithang, Zilukha, Kawangjangsa, Yangchenphu, Changzamtok, Changbangdu, Changjiji

	Name	Area of Residence/Occupation
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6.10	1	6.11 Dasho Kinlay Dorji	6.12 Thrompoen, Thimphu Thromde
6.12.1.1		6.13 Sonam Letho	6.14 Architect, Lower Motithang
6.15	3	6.16 Kuenga Yonten	6.17 Norzin
6.18	4	6.18.1.1.1.1.1.1.1.1 Tshering Dorji	6.18.1.1.1.1.1.1.2 Norzin
6.19	5	6.20 Geden Dorji	6.20.1.1.1.1.1.1.1 Norzin
6.21	6	6.22 Dorji Dema	6.23 Motithang
6.24	7	6.25 Deki Yangzom	6.26 Motithang
6.27	8	6.28 Phub Dem	6.29 Olakha
6.30	9	6.31 Thuji Om	6.32 Changgangkha
6.33	10	6.34 Thinley Dorji	6.35 Changgangkha
6.36	11	6.37 Choden	6.38 Changgangkha
6.39	12	6.40 Yeshey Dorji	6.41 Changgangkha
6.42	13	6.43 Tandin Wangchuk	6.44 Changgangkha
6.45	14	6.46 Sonam Wangmo	6.47 Norzin
6.48	15	6.49 Karma Dorji	6.50 Changzamtok
6.51	16	6.52 Sangay Wangchuk	6.53 Changzamtok
6.54	17	6.55 Tsholung Dorji	6.56 Changzamtok
6.57	18	6.58 Yeshi Lhendup	6.59 Changzamtok
6.60	19	6.61 Rinzin Chopel	6.62 Norzin Tshogpa
6.63	20	6.64 Tshagay	6.65 Norzin
6.66	21	6.67 Tandin Dorji	6.68 Norzin
6.69	22	6.70 Phutsho Wangdi	6.71 Changbangdu
6.71.1.1		6.72 Phub Tshering	6.73 Maday Tshogpa, Norzin
6.74	24	6.74.1.1.1.1.1.1.1.1 Tashi Dorji	6.75 Changgangkha

6.76	2 5	6.77 Zangmo	6.77.1.1.1.1.1.1.1 Changgangkha
6.78	2 6	6.79 Chenzom	6.80 Changgangkha
6.81	2 7	6.82 Ugyen Dema	6.83 Changzamtok
6.84	2 8	6.85 Thinley Namgyel	6.86 Changzamtok
6.87	2 9	6.88 Tshokey Dorji	6.89 Changzamtok
6.90	3 0	6.91 Ugyen Wangcuk	6.92 Norzin Tshengpa Tshogpa
6.93	3 1	6.94 Tshering Dorji	6.95 Yangchenphug
6.96	3 2	6.97 Kinely Zam	6.98 Ziluka
6.99	3 3	6.100 Pema S.Tshering	6.101 Bhutan Broad Casting Services
6.102	3 4	6.103 Sangay Chophel	6.104 Bhutan Broad Casting Services
6.105	3 5	6.106 Yeschi Choden	6.107 Bhutan Broad Casting Services
6.108	3 6	6.109 Pema Yuden	6.110 Bhutan Broad Casting Services
6.111	3 7	6.112 Chhimi Om	6.113 Motithang
6.114	3 8	6.115 Tshering Wangmo	6.116 Norzin
6.117	3 9	6.118 Dorji Wangchuk	6.119 Norzin
6.120	4 0	6.121 Dago Beda	6.122 Changzamtok
6.123	4 1	6.124 Dhendup	6.125 Changzamtok
6.125.1		6.126 Kinga Singye	6.127 Changzamtok
6.127.1		6.127.1.1.1.1.1.1.2 Sangay Wangdi	6.128 Kawang Jangsa
6.129	4 4	6.129.1.1.1.1.1.1.1 Aum Phub Zam	6.129.1.1.1.1.1.1.2 BCCI Chairman/Chang Gedaphu
6.130	4 5	6.131 Sonam Desel	6.132 PPD, MoWHS
6.133	4 6	6.134 Sonam Tshewang	6.135 Thimphu Thromde
6.136	4 7	6.137 Tshering Dorji	6.138 DHS, MoWHS
6.139	4 8	6.140 Tshering Dendup	6.141 NEC

6.142 4 9	6.143 Sonam Peldon	6.144 PPD, MoWHS
6.145 5 0	6.146 Dorji Wangmo	6.147 PPD, MoWHS
6.148 5 1	6.149 Thinley Norbu	6.150 Thimphu Thromde

6.151 Strategic Environment Assessment for Thimphu Structure Plan

6.152 Public Consultation Meeting MoWHS

6.153 January 25, 2018, 2018 (10:00AM- 4:00PM) Yangchenphug Higher Secondary School, Thimphu

6.154 Areas/Zone:Lungtenphu, Lubding, Yangchenphug, Semtokha, Babesa

	6.155 Name	6.156 Area of Residence/Occupation	6.157 Email address
6.158 1	6.159 Dasho Kinlay Dorji	6.160 Thrompoen, Thimphu Thromde	
6.161 2	6.162 Tashi Penjor	6.163 Semtokha, RBP	
6.164 3	6.165 Gaki	6.166 Lubding	
6.167 4	6.168 Kinley Zam	6.169 Olakha	
6.170 5	6.171 Tandin Om	6.172 Olakha	
6.173 6	6.174 Ugyen Lhendup	6.175 Semtokha	
6.176 7	6.177 Tshechup	6.178 Semtokha	
6.178.1	6.178.1.1.1.1.1.2 S angay Rinch en	6.179 Yangchenphug	
6.180 9	6.181 Tandin Wangmo	6.182 Lungtenphug	6.183 tandinwangmo@gmail.com
6.183.1	6.183.1.1.1.1.1.2 U gyen Bidha	6.183.1.1.1.1.1.3 Lungte nphug	
6.184 1 1	6.185 Holem	6.186 Lungtenphug	
6.187 1 2	6.188 Choden	6.189 Lungtenphug	
6.190 1 3	6.191 Phub Dem	6.192 Tshogpa	
6.193 1 4	6.194 Wangchuk Gyaltshen	6.195 Lubding/Lungtenphug	6.196 wangchukgyaltshen@gmail.com
6.197 1 5	6.198 Pema S. Tshering		
6.199 1 6	6.200 Kinley Dem		

6.258	6.259 Jigme Wangchuk	6.260 Dy. General Manager, Bhutan Telecom Limited	6.261 jigme.wangchuk2237@bt.bt
6.262	6.263 Sangay Choeda	6.264 Regional Manager, Bhutan Telecom Limited	6.265 rmwr@bt.bt
6.266	6.267 Ugen Namgyal	6.268 Zhung Dratshang	6.269 namgyel@gmail.com
6.270	6.270.1.1.1.1.1.1.1 a s h i p h u n t s h o	6.270.1.1.1.1.1.1.2 Coordinator, CMD, RSPN	6.271 tashiphuntsho@rspnbhutan.org
6.272	6.273 Jamyang Singye	6.274 RENEW	6.275 jamjsntd@gmail.com
6.276	6.277 Tshering Dhendup	6.278 National Environment Commission	
6.279	6.280 Sonam Peldon	6.281 PPD, MoWHS	
6.282	6.283 Thinley Norbu	6.284 Thimphu Thromde	
6.285	6.286 Sonam Tshewang	6.287 Thimphu Thromde	
6.288	6.289 Sonam Desel	6.290 PPD, MoWHS	

(c) Minutes of the Public Consultation held in January 2018

Minutes of Meeting Public Consultation held on 23rd, 24th, 25th and 30th January 2018

Stakeholder Consultation with Central Agencies, Local Governments and Thimphu Thromde was held on January 19, 2018 in Ministry of Works and Human Settlement's Conference hall.

Public Consultation was held on 23, 24, 25 January, 2018 in Dechencholing Higher Secondary School Hall (Hejo, Samtenling, Pamtsho, Jungshina, Langjophakha, Taba and Dechencholing); Changangkha Middle Secondary School (Core area, Motithang, Zilukha, Kawangjangsa, Yangchenphug, Changzamtok, Changbangdu and Changjiji); Yangchenphu Higher Secondary School (Lungtenphu, Simtokha and Babesa) respectively. The consultation meeting with the CSOs, NGOs, BCCI, Private Sectors, Industrialist, Dratshang Lhengtshog, Service Providers like Bhutan Telecom, Bhutan Power Corporation was held on 30 January 2018 in MoWHS Conference Hall. Please find the list of participants attached.

The objective of organizing the stakeholder and public consultation meeting was to present on the findings of the SEA for TSP report and request for validation of information. In addition, the meeting also requested for comments or feedback on the First Draft SEA for TSP report. The First Draft SEA for TSP is a preliminary report for which further works will be done after consultation meetings. The meeting will discuss on comments, feedbacks and recommendation to further improve on the First Draft Report.

During the stakeholder and public consultation meeting, a general presentation was made by NEC on SEA and SEA for TSP in order to inform the participants on what is SEA, what is the purpose of conducting SEA and the SEA for TSP and how we are conducting the SEA for TSP.

The main topic for consultation is on TSP and why SEA for TSP is conducted. It was crucial that the participants are made aware on what is the TSP. Therefore, a presentation of TSP was made by Thimphu Thromde. Thimphu Thromde also presented on what was implemented and not implemented in the TSP for the benefit of the participants in the meeting. Following, the presentation on SEA for TSP was made whereby the approach and methodology of SEA TSP were outlined. The presentation included the process methodology whereby the screening and scope of work, the analytical component, projection of issues etc.

A detailed presentation was made on the projection of issues with recommendations. The issues included land use, slope analysis, neighbourhood nodes, Governance, disasters and infrastructure & services for water, sewerage, storm water drainage, solid waste, transport and housing.

Dasho Kinlay Dorji, Thimphu Thrompoen made the opening remarks in all the public consultation meetings. Dasho Thrompoen informed that Thimphu Structure Plan (TSP) has been prepared in 2000 for Thimphu (2002-2027) with requirements for future urban development projected for the next 25 years. The implementation of TSP is already underway and it is important that potential environmental challenges and impacts are discussed in this discussion forum. The Public Consultation forum is not just to present for existing situation but to also discuss on further projections of issues related to Thimphu Thromde in order to have implementable policies, plans and programmes/projects.

Thimphu Thromde is facing several environmental and there is a need to manage our environment. The Ministry of Works and Human Settlement is coordinating the preparation of the Strategic Environmental Assessment for Thimphu Structure Plan (SEA for TSP) with Multi Sectoral Agencies like Ministry of Works and Human Settlement, Thimphu Thromde, National Environment Commission, National Land Commission and Gross National Happiness Commission and technical assistance from the Korean Environment Institute.

This SEA conducted for Human Settlement is the first of its kind wherein the First Draft Report has been prepared. The stakeholder, public, NGO/CSO/Private Sector, religious bodies consultation meeting is being held to present this Draft SEA for TSP report to take in comments, views and recommendation so that the comments can be incorporated in the Draft report.

Waste: Waste volume is increasing. Thimphu Thromde working on the management of solid waste through Integrated Solid Waste Management – from source segregation, storage, collection, transportation to disposal of waste. However, there is a need for public to understand that individuals must help in the ISWM through segregation, storage and disposal. It is important for all general public to manage their own waste by reducing their waste generation and reusing wastes that can be reused; not littering and open dumping of their wastes; and protecting our environment by keeping all streams and drains clean.

Thimphu Thromde is currently working towards closing the Memelhakha landfill with support from the public through construction of new compost plant in Memelhakha landfill and promoting recycling centers such as manufacturing plants which produce egg trays from paper wastes. Hence, the public was requested to reduce the amount of waste generated so that the wastes going to the landfill gets reduced. It is aimed that the landfill will then be converted to picnic spots which public can use for recreation facilities.

Transport: The number of vehicle are increasing and this would result in smog which is most visible during the morning. The situation would become worse due to the increase in pollution and would result to the unalterable bad air quality like Delhi. There is a need to reduce the fleet of cars plying in Thimphu Thromde roads as Thimphu Thromde is currently facing the issues of congestion, lack of parking areas. The public was encouraged to make use of public transport system.

Thimphu Thromde is currently working in increasing the number of public electric buses. Thimphu Thromde has already initiated the promotion of use of public transport buses where schools in Thimphu Thromde were provided with school buses. However, there is a need for more buses and support from relevant stakeholders to increase the number of bus fleet in Thimphu Thromde. This will help reduce pollution and protect the environment from deterioration.

Thimphu Thromde does not want Thimphu Throm to be a Throm for vehicles but a Throm for pedestrians. Hence, Thimphu Thromde is currently working on the pedestrianisation of Norzin Lam which is proposed as per the TSO for which public consultation is being held on January 25, 2018. In addition, the Thimphu Thromde has already initiated the construction of footpaths from Lhudrung Park connecting till the expressway in Babesa to promote pedestrianization.

Thimphu Thromde is working with the MoIC on the GCF project whereby it has been proposed to have two lanes with one lane specified for buses (i.e. rapid bus transit). This is also being proposed in the 12th Five Year Plan in order to achieve the reduction in traffic congestion.

Neighborhood Nodes: Thimphu Thromde is also currently working on implementation of the neighborhood nodes giving special emphasis on open green spaces which is being proposed in the 12th Five Year Plan. The Thromde is also working on beautification of Thimphu Thromde.

Comments from the public

Housing: Mr. Geden Dorji informed that there is a need to promote and support home ownership and social housing as most people do not own houses. It was informed that the Ministry of Works and Human Settlement is in the process of formulating the Housing Policy and housing for all will be covered to address the needs for housing.

Neighborhood Node: Mr. Chimmi, representative for Norzin Area informed that there is a need for a meeting hall to conduct meetings with public as it is causing inconvenience to the Tshgopas to organize meetings. The meeting was informed that with the implementation of Neighborhood Nodes, this issue would be solved, as there is land that has been allocated for town hall meeting.

Public Park in Changzamtog: Aum Dago Beda representative of Norzin area expressed that moving hard ware stores to the outskirts of the core is good. Like wise, it was expressed that there is a need to relocate the sawmills within the Thromde. She also commended on the good works done by the Thimphu Thromde in spite of working on limited financial and human resources. She informed that there are no public parks in the LAP of Changzamtog. On behalf of the residents of Changzamtog, she requested Thimphu Thromde to allocate any vacant plot for development of the Park. It was proposed that the residents of Changzamtog would adopt the park and assist Thimphu Thromde in the development of the park in Changzamtog.

Traditional Village: It was also expressed that there is a need to maintain traditional structures in the area as this would enhance our tradition and also attract tourist as well. However, individual owners would not benefit economically but the general public would benefit. In addition, Mr. Tshoki Dorji from Changzamtog also expressed the old traditional structures are not stable and they fear for its stability during times or earth quakes. However, traditional villages should be maintained to preserve our cultural and traditional structures. Therefore, it was recommended that there is a need to maintain the traditional structures whereby the Government provides encouragement of maintenance of traditional structures and villages through incentives.

Transport: Mr. Rinzin Chopphel, Taxi president from Norzin area informed that the number of taxis have been increasing and this would also led to the increasing in the air pollution which will have adverse impact on the environment and health of the public. It was informed that through MoIC and RSTA, a project is formulated whereby all the taxis will be replaced by 300 electric vehicles. This would result in the reduction of carbon emission. However, it was requested that there is a need to designate and plan for charging stations and parking areas for Electric Vehicles in each Local Area Plans within Thimphu Thromde.

Transport: Aum Phub Zam, President of the Private Sector and Thuemi of Core Area informed that there are grievances as a result of the proposed pedestrainization of Nozin Lam. There is a need to further discuss on the issue. It was informed that a separate public consultation meeting is being held on January 25, 2018 to discuss on the pedestrainization of Norzin Lam.

Governance: Representatives informed that there is a need to discuss on the Governance aspect since there is a lot of coordination of issues related to construction of infrastructures for services by all services providers. It was recommended that there is a need for the Thromde to be corporatized so that they will be able to function more efficiently.

Water: Changzamtog is facing water supply problems mainly because there is no provision for new houses to connect to the existing distribution line. Hence, there is a need for a water master plan. The meeting was informed that the need for formulating and implementation of Water Master Plan has been included in the draft SEA for TSP report.

Solid Waste: Aum Dago Beda informed that there is a need to create awareness on solid waste management whereby people should manage their own trash. Various mediums like media and social medias should be used to inform the people. In addition, there is a need to fine those who litter and open dump their wastes into open spaces, rivers, streams and drains. It was also informed that the representative felt that the solid waste management fee which is charged with the land tax is less. In addition, only the house/building owners were paying for the solid waste management fee and hence should be charged to all individuals.

With regard to solid waste management services provided by the Thimphu Thromde, it was expressed that the public had issues with the timing of waste collection. Collection time for solid wastes needs to be reworked such that it is convenient for households to dispose their wastes into the collection vehicles. Hence, there is a need to improve the existing solid waste management collection system to provide efficient services.

Land use: Wacha Sangay from Jungshina area informed that from the presentations, it was informed that there is a need to move the Endowment area from the core to the outskirts. In this regard, the meeting was informed that there is a need to discuss with stakeholders and work on relocating the agencies in the Endowment area to the outskirts. However, there is a need to plan properly and work on issues related land pooling and land swapping prior to implementation.

Representative from Taba requested that the area above Taba road also be included in the LAP. Currently, only the area below the road in Taba has a LAP which is being implemented.

Services Providers: Representative from Bhutan Telecom informed that Bhutan Telecom is a service providing agency and they have to provide service lines for telecommunication. The meeting was informed that during implementation, Bhutan Telecom faces issues since there are no provisions kept for service lines/ducts. There is a need to keep provision for service providers in Thimphu Thromde's plans. The meeting was informed that those areas which do not have LAPs, do not have provisions for service ducts are those areas have already been developed prior to the implementation of TSP. However, those LAPs that have been planned and implemented have provision for service ducts. The services providers were requested to consult with the Thimphu Thromde during implementation their project in order to prevent digging of roads and footpaths.

Representative from Dratshang Lhentshog informed that while making plans, there is a need to include stakeholders in the meetings whereby all relevant stakeholders including private can make the plans together. This would allow for smooth implementation of projects. Also, in case the Thimphu Thromde has plans which are for social purposes, representative from Dratsang Lhentshog informed that the proposal may be submitted to them for review.

Disaster: The representative from Bhutan Telecom and Dratsang Lhentshog informed that there is a need to include strategies for evacuation from buildings during times of disaster like earth quake and fires. The requirement for evacuation should be included as a pre-requisite for all house constructions. The meeting was informed that the Bhutan Building Rules and Development Control Regulations stipulate the requirements for fire exits in all buildings.

Different abled friendly infrastructure: Representative from Dratsang Lhentshog informed that there is a need to give priority to implementation of differently abled infrastructure. Currently, most infrastructures including Dzongs do not have provisions made and hence, making it difficult for the aged and differently abled to visit during important and religious occasions.

(d) Minutes of the Stakeholder Consultation with Central Agencies, Local Governments and Thimphu Thromde in January 2018

Record of Discussion for Stakeholder Consultation Meeting for Strategic Environment Assessment for Thimphu Structure Plan

Dasho secretary welcomed all the participants to the TSP SEA stakeholder meeting and briefly explained the background and objectives of carrying out SEA for Thimphu Structure Plan. SEA is a tool to guide decision makers in making informed decisions on Policies, Plans and Programmes. Developments in Thimphu city has occurred rapidly since the endorsement of the Thimphu Structure Plan in 2004. The developments envisioned in the structure plan requires to adapt to new times and development scenario.

The TSP is subjected to SEA to understand the issues and gaps in the implementation of the TSP which will guide with necessary inputs in the revision of the TSP. The stakeholder meeting and the subsequent public consultation meetings is expected to provide varied suggestions, opinions and comments.

The draft TSP SEA will be scrutinized through rigorous consultative process in the form of stakeholder meetings, discussions in online forums and panel discussions in BBS to make the draft as transparent as possible.

Presentations and Discussions

Sonam Desel presented the outline of the meeting. The first draft is based on the desk reviews and available secondary data. The stakeholder meeting is conducted to validate the information.

Tshering Dendup, Environment Officer, NEC, presented on the SEA process as required by environment laws and legislations. All Policies, Plans and Programs that may have adverse impact on the environment is to be subjected to SEA.

Thinley Norbu, CUP, Thimphu Thromde comprehensively presented what is enshrined in the TSP, what has been implemented and what has failed to take off, of the TSP. The discussions thereof is list as follows:

Bus Terminal

Representative from the RSTA enquired when the land for new bus terminal will be released for development, and suggested if the land of the soon-to-be decommissioned sewerage treatment plant could be identified for the new bus terminal.

Thinley Norbu explained that the site of the decommissioned sewerage treatment plant is unsuitable for bus terminal due to entry and exit problem. The new bus terminal site identified in the TSP is suitable as all the vehicles from other dzongkhags converges there. However, the establishment of

bus terminal in the proposed area has failed to take-off due to land issues with the owners. There is hope for some direction on the matter after public consultation on 26 Jan 2018. He suggested if the NLCS could follow acquire the land or swap the land as it was done for the diplomatic enclave.

Director, NLCS, said that the proposal of the land swapping will not be possible for the case. He explained that the initial plan was to acquire the land (about 6 acres) for the bus terminal but land owners did not agree with the plan. Instead he suggested that a PPP business model could be explored for implementing the bus terminal plan. Discussion on the proposal was superficially discussed in the past but owing to lack of capacity for putting up concrete PPP business model it got shelved. Although Thromde pushed the plan rigorously ultimately it got sidelined due to numerous other competing priorities i.e., implementation of other approved LAPs. In order to make the implementation of the TSP successful there is need for agencies to take ownership of the respective components of the plan. Thromde alone cannot do much. Therefore, there is need for concerned agencies to participate in all discussions relating to the relevant components.

Dasho secretary concluded that it is an excellent opportunity to bring together all the concerned agencies for taking the collective ownership of implementing the TSP. For the bus terminal, and for the purpose of the SEA, it is important to flag the urgent need of establishing the bus terminal. On how to operate it could form a whole discussion separate from the SEA.

On-street Parking

Representative from the GNHC commented that while Thromde has amply constructed roads around the corners of the city other agencies may be failing to do their part as the on-street parking is limiting the road width and choking the free circulation of traffic.

The topology of the landscape makes it difficult to provide accessibility to basement parking and hence there is spilling of parking on the road. Besides people do not comply with the approved site plans. The problem is worsened by uninformed decisions made with respect to the TSP by ignoring the development control regulation. For instance, in upper Cangbangdru, the TSP allows 3 floors only but currently there are buildings with as many as 7 floors as a result of which there is traffic congestions and parking woes.

In order to make Thimphu city successful the foremost important factor is the efficiency of the transport system. Many parts of the Thimphu city should be pedestrianized as possible. The main transport for the people should be public transport to get within Thimphu.

Excessive land classification

There are 22 precincts and 15 urban villages which is far too many classifications for a small city of 26 Km² radius, with little differentiation between the precincts and Urban villages. In any case the rapid future development will exert pressure on the available land and will be hard to maintain these classifications. Ultimately whole of the Thimphu city should function as one. If through the SEA the number of precincts could be reduced to the minimum.

In the urban landuse precinct with the NLCS, there are as many as 74 categories nationwide. It would be opportune moment for the Comprehensive National Development Plan to relook at the number of landuse categories. It is simply impossible for the common people to understand the distinction.

(need to analyze the precincts and UV)

Some plots under E4 category has < 30% gradients whereas some plots in UV 2, which is low and medium density, was found to be > 30%. Constructions in slopes poses danger to the buildings as people do not opt for split design of the building and always cut the slope. The cutting damages the environment. It is recommended to do detail analysis of the areas and appropriately reassess the land use.

Director NLCS enquired if the workshop in Pamtsho is actually suspended as shown in the presentation. He clarified that the landuse has been captured in the data base and *lagthram* has been issued.

Thimphu Structure Plan has identified 16 Traditional Villages. All traditional structures are inventoried. Tourist come here but do not spend much time here. There is need to think about connecting all the traditional structures like dzongs.

Implementation of Neighbourhood Nodes and coordination issue

There are 9 neighbourhood nodes in the TSP. Each neighbourhood node is supposed to house some of the basic but essential services like health, shopping which will resolve many urban-centric problems as each local area plan will have a neighbourhood node. The neighbourhood node land exists for Dechecholing, Hejo, Taba, Langjophakha, Lower Motithang, Lungtenphu is left, but it has been lost for Babesa, Changbangdru and Changzomtog LAPS. As of now no neighbourhood node is implemented and many deviations are taking place. There is need for stakeholder collaboration to implement the neighbourhood node and it should come out as a major recommendation of the SEA.

There is general perception that things are much cheaper in the core than the outskirts. Even if neighbourhood nodes are implemented there are chances that people will still move to the core for shopping.

As far as ownership is concerned, Thromde as the authority should take the lead role and pull-in line agencies. Ministry of Health is planning to expand Satellite clinics in Changjiji, Jungshina, Pamtsho and unless the line agencies are made aware by the Thromde coordination issues will remain.

Disaster

There is need to protect the rivers and streams that passes through the town and the width of the rivers and streams are getting narrower and it takes only few hours for the flashfloods to wipe out the water bodies.

The city face risk of flash flood and destruction of infrastructures near the river. The 2009 flash flood from the Olarongchu submerged vehicles parked near the workshop which why a buffer of 30 meters is required to protect lives and properties.

There is more fire hydrants in Kawangjansa than in the core which has high density of population.

The draft has covered the hazard zones. It is lacking clear cut recommendations on what needs to be done. One document to refer is the contingency plan prepared by the Thromde.

Water

Watershed management division under MoAF is in the process of preparing Thimphu Watershed Masterplan. Stakeholders exists from different agencies and public consultation meetings in Naro,

Chamgang, Kawang gewogs and with Thromde has been completed last year. The findings and recommendations from the SEA are similar to what the Watershed Management Division has found out in their study. Based on these it has come up with activities and budget plan.

The Thimphu Watershed Master Plan also promotes *payment for environmental services (PES)* but is discussing with Thromde on how to implement it.

Fecal coliform in the river and streams cannot be avoided. If there is no protection it can be easily contaminated. There is need to think how to implement the recommendation of treating storm waters.

Sewerage

The SEA should also take into account the effluents from the car wash services. It should recommend whether to opt for a centralized or individual treatment plants. The problem will worsen in the future. The affluent from the car wash services is directly discharged to Olarongchu and Wangchu river.

Shouldn't the SEA propose how the decommissioned treatment plant area which is about 13 acres should be put to use after keeping 30-meter buffer?

Landfill

There is no way to avoid landfill but there is need to seriously consider the location of the landfills. The Memelhakha landfill is located uphill and similarly Paro has decided to make landfill above the town and that too near to the stream.

Transportation

No major recommendations on transportation because of lots of documentation and studies like Transport Vision 2040 and BRT proposals done on transportation. The BRT proposal will help in making a reliable public transport between North and South Thimphu.

Currently ministry of finance procures the buses and the Bhutan Post operates and fixes the bus fares whereas RSTA regulates the safety aspects of the transport sector. There is lack of coordination between these agencies. It is recommended for a dedicated transport unit under Thimphu thromde to look after the public transportation affairs.

MoC is coming up with the Transport Policy. There is need to align the recommendations of the SEA with the upcoming Transport policy. The government is considering to provide subsidies to replace conventional taxis with about 300 e-Taxis. The demand for related infrastructure will increase.

Housing

Housing is essential and should be accessible for all. The issue is more about affordability not availability. The study found that there is enough land for housing. Few more LAPs are yet to be implemented. The affordability of housing needs multi-sectoral participation. In order to resolve the housing issue, the ministry is revising the housing policy which will look into all the issues.

There are many reserved service plots in all LAPS, the SEA could propose to use those service plots for constructing houses for the low-income groups. The initial idea was for service utility but all the service utilities are provided and land is vacant.

Need for policy coordination especially with education ministry as many private schools coming up in overall the place without due consideration for the land-use.